**UNIVERSITY OF CAPE COAST**

# EFFECTIVENESS OF PUBLIC AGRICULTURAL EXTENSION AS PERCEIVED BY FARMERS AND DEVELOPMENT AGENTS IN SODDO-ZURIA WOREDA OF WOLAITA ZONE, ETHIOPIA

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**BY**

**BERHANU NEGA WASIHUN**

**Thesis submitted to the Department of Agricultural Economics and Extension, School of Agriculture, University of Cape Coast, in partial fulfilment of the requirements for award of Doctor of Philosophy Degree in Agricultural Extension**

**OCTOBER, 2010**

## DECLARATION

### Candidate's Declaration

*I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.*

Candidate's Signature: ..... Date: .....

Name: BERHANU NEGA WASIHUN

### Supervisors' Declaration

*We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.*

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## ABSTRACT

The study examined farmers and development agents' (DAs) perceived effectiveness of the Public Agricultural Extension Service (PAES) in Soddo-zuria *Woreda*, Southern Ethiopia. Hence, 225 farmers and 85 DAs were randomly selected; pretested and validated questionnaires were used; and data were analyzed using Software Package for Statistics and Simulation (SPSS).

Farmers and DAs' perceived effectiveness levels of the PAES were found to be low though the mean difference between the two groups was significant. Within the farmers, perceived effectiveness levels of female farmers, poor farmers, and uneducated farmers were significantly lower than their counterparts. From farmers' response, relevance of extension packages, participation in extension, motivation by extension, educational status, wealth status, sex, DAs' professional competence, and satisfaction with extension explained 84 percent of the variation in effectiveness of the PAES. From DAs' response, relevance of extension packages, farmers' participation in extension, research and Subject Matter Specialists (SMS) support, and DAs' participation in extension explained 88 percent of the variation in effectiveness of the PAES.

The findings imply that the Soddo-zuria *Woreda* Bureau of Agriculture and Rural Development should play a critical co-ordinating role in developing relevant extension packages through functional links with research agencies and enhancing farmers' participation; stratifying extension approaches based on sex, wealth and educational status of farmers; enhancing farmers' motivation and satisfaction with extension; getting SMS support; improving DAs' professional competence and participation in the PAES.

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## DEDICATION

To my father Kes Nega Wasihun and my mother Tsehaynesh Geteneh

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## LIST OF ACRONYMS

| | |
|---|---|
| ADLI | Agricultural Development Led Industrialization |
| AKIS/RD | Agricultural Knowledge and Information System for Rural Development |
| ASARECA | Association for Strengthening Agricultural Research in Eastern and Central Africa |
| ATVT | Agricultural and Technical Vocational Training institutes |
| BoARD | Bureau of Agriculture and Rural Development |
| CSA | Central Statistical Authority |
| DA | Development Agent (equivalent to extension agent) |
| E.C. | Ethiopian Calendar |
| ESSDN | Environmentally and Socially Sustainable Development Network |
| FFS | Farmers' Field Schools |
| FAO | Food and Agriculture Organization of the United Nations |
| FTC | Farmers' Training Centre |
| GDP | Gross Domestic Product |
| GFDRE | Government of Federal Democratic Republic of Ethiopia |
| ICT | Information Communication Technology |
| IECAMA | Imperial Ethiopian College of Agriculture and Mechanical Arts (now, Haramaya University) |
| IPM | Integrated Pest Management |
| LBL | Landwirtschaftliche Beratungszentrale Lindau (Swiss Centre for Agricultural Extension) |
| MDGs | Millennium Development Goals |

| | |
|---|---|
| MoARD | Ministry of Agriculture and Rural Development |
| NGO | Non Governmental Organization |
| PADETES | Participatory Demonstration and Training Extension System |
| PAES | Public Agricultural Extension Service |
| SD | Standard Deviation |
| SMS | Subject Matter Specialist |
| SNNPRS | Southern Nations, Nationalities and Peoples' Regional State |
| SPSS | Statistical Package for the Social Sciences (Software Package for Statistics and Simulation) |
| T & V | Training and Visit Extension System |

# CHAPTER ONE

# INTRODUCTION

## Background to the Study

Agriculture is a dominant sector for economic development and poverty alleviation in Africa (Haug, 1999; Mokone & Steyn, 2005; Ngomane, 2004). The sector, on the average, provides 60 percent of all employments in the continent (Ngomane, 2004).

In Ethiopia, the agricultural sector accounts for about 60 percent of the total GDP, and brings about 90 percent of foreign currency. About 85 percent of the working population is also employed in agriculture. In the country, the industrial and service sectors are also largely dependent on the performance of this sector. Agriculture provides raw materials for the agro-processing industries and generates foreign currency to import essential commodities (Berhanu, 2008; Croppenstedt & Muller, 2000).

In Ethiopia, agricultural production and productivity is very low as in many other sub-Sahara African countries (Anandajayasekeram, *et al.*, 2008). World Bank (2000) indicated that in Africa, per capita food production has declined in most years since 1970 and is reflected in recurrent famine. This situation is even worse specifically in Ethiopia. Ethiopian agriculture, though it has a potential to play all the aforementioned roles in the economy of the country, is based on subsistent farm households whose modes of life and

operations have remained unchanged for centuries; and as a result of which, high proportion of farm households are unable to feed their families and frequently depend on food aids. Hailu and Regassa (2007), for instance, in a study conducted in Southern Nations, Nationalities and Peoples' Regional State, indicated that 59% of the population in the region were under food insecure situation.

In Ethiopia, to improve the agricultural sector, public agricultural extension service (PAES) has been provided for farmers, with varied intensity and coverage, for more than seventy years – since 1931 up to now (Gebremedhin, Hoekstra, and Tegegne, 2006; Institutions for Natural Resource Management, n.d; Kassa, 2003; Tessema, 2000). However, the status of agriculture and its productivity level is yet abysmally low and could not satisfy the growing food demand of the population. The problem is largely attributed to the extension system (Anandajayasekeram, *et al*., 2008; Kassa, 2003; Tessema, 2000: Gebremedhin, Hoekstra & Tegegne, 2006).

Currently, having recognized the pivotal role of agriculture in the country's economy, the Government of the Federal Democratic Republic of Ethiopia (GFDRE) is striving to transform the subsistent mode of production to a level of self-sufficiency and eventual commercialization. To facilitate this process, it has designed Agricultural Development Led Industrialization (ADLI) strategy primarily to enhance productivity of smallholding farms and improve the food security situation of the country. To this effect, a system of agricultural extension known as "Participatory Demonstration and Training Extension System" (PADETES) was formulated in 1995. In this system of extension, the intervention strategy, as the phrase implies, involves

demonstration and training of farmers in proven agricultural technologies in a participatory manner (GFDRE, 2002).

To further refine agricultural extension provision, the Ministry of Agriculture and Rural Development (MoARD) had also developed a "Guideline on Agricultural Extension in Ethiopia" in 2006. This document consists of the main policy frameworks and directions for effective extension delivery system and leaves rooms for adapting it according to regional contexts (MoARD, 2006). Within the broader policy framework, the Bureau of Agriculture and Rural Development (BoARD) of the Southern Nations, Nationalities and Peoples Regional State, SNNPRS, also developed a "Guideline on Participatory Extension and Delivery Systems" (BoARD, 2007). Both the federal and regional guidelines stipulate the importance of need based agricultural extension delivery system that clearly target diversities in agro-ecology, gender, resource endowments of farmers and market opportunities for farm outputs. However, there is no any significant empirical evidence that shows whether the extension system is implemented as per the federal and regional guidelines.

Globally, there are a number of studies that indicate the ineffectiveness of PAES in a number of parameters including the low accountability level to farmers and lack of relevance of programmes to diversified needs of clients (see, for instance, Anandajayasekerem, *et al*., 2005; Arega & Rashid, 2003; Berhanu, 2008; Campbell, 1999; Davidson & Ahmad, 2002; Dulle, 2000; Environmentally and Socially Sustainable Development Network, ESSDN, 1995; Farrington, 1994; Feder, Willet & Zijp, 2001; Kassa, 2003; Rural

Industries Research and Development Corporation, RIRDC, 2003; Rivera, 2008; Rivera, Qamar & Van Crowder, 2001).

According to Rivera, Qamar, and Van Crowder (2001) the PAES is practically barely functioning and is moribund because of generic operational difficulties and bureaucratic-political bottlenecks within which it is managed. In a supporting manner, Feder, Willet and Zijp (2001) identified eight characteristics of PAES that jointly attribute to its ineffectiveness. These are:

- *Large scale and complexity of extension operations* – in developing countries, large numbers of illiterate farmers settling in geographically dispersed areas operate on small plots. Those geographically dispersed areas are poorly linked with transport facilities, and the high level of illiteracy prohibits the use of electronic and print media that may not require a face to face extension contact in a situation where there is a high farmer to development agent ratio.
- *Influence of the broader policy environment* – extension operates in an environment where policies and institutional actions are not, in most cases, under its control. This may primarily include credit, input supplies, price relations, and marketing channels.
- *Problems related to links between extension and knowledge generating institutions* – in this aspect the authors argue the problems of extension in most of the developing countries in comparison to the Cooperative Extension System of the United States where knowledge is generated and extension is carried out by the same institution, the universities. In developing countries,

research and extension agencies belong to different institutions and often there are problems associated to this – managerial problems, competing for budget, status and qualification difference complexities among research and extension staff, and problems related to various forms of incentive mechanisms in research and extension.

- *Difficulties in tracing impacts of extension* – often it is difficult to single out extension's impact on observed changes as many factors affect agriculture in a complex way.
- *Problem of accountability* – in this dimension, there are no proven mechanisms and incentive arrangements to make extension more accountable, particularly, to farmers. Indicators of performance are often related to amount of inputs used by farmers that may not necessarily indicate change in productivity and livelihood of farm families.
- *Weak political commitment and support* – this problem is, in a vicious circle, related with the problem of identifying real impacts attributed to extension, which in turn, be a reason for low political support.
- *Problems related to fiscal sustainability* – this is, in turn, related with the weak political commitment to allocate adequate budget for extension work.
- *Extension staffs' involvement in duties other than core extension work* – the authors ascertain that in many developing countries it is common that extension staffs are involved in activities such as

collecting taxes, organizing different forms of statistics, administering credit related activities, input distribution and spending time on various forms of regulatory activities at the expense of core extension functions. All these eight characteristics jointly affect the performance of the PAES and deem it ineffective.

From the foregoing discussion, it seems that there is a fair degree of consensus on the ineffectiveness and problems of the PAES among extension professionals though there is no mutual agreement on the solutions to be given. To address those weaknesses in PAES provisioning, several attempts have been made in different countries including: introduction of the training and visit extension system, decentralization, fee for service, farmers' field schools and privatization of extension. The main essences of those approaches and practices are briefly outlined below.

*Training and Visit (T & V) extension system* – this system of extension was practised in many countries mainly between 1975 and 1995 (Umali & Schwartz 1994, cited in Anderson & Feder, 2004). The T & V extension system is characterized with a single line of command which is presumed to rectify the multi-purpose development agents' disarrayed responsibility. Development agents are also provided training every fortnightly and they are supported with subject matter specialists in their field works. However, T & V extension system was criticized by many authors (see for instance, Anderson & Feder, 2004) of being costly in allocating all the required money for training, transportation and field activities; and in satisfying the required number of development agents to maintain a reasonable ratio of extension staff to farmer. Regarding to costs, Anderson and Feder (2004) reported a 25

percent to 40 percent increment in comparison to a system of extension it tried to replace. Rigidity of the biweekly training programmes, lack of adequate subject matter specialists, and non-representativeness of contact farmers to the wider farming community were also critical problems associated to the T & V extension system. Owing to those drawbacks, the T & V system was practised in different countries just as campaign and it couldn't lay any mechanism towards sustainability.

*Decentralization* – is another attempt that has been made by various countries to overcome problems attributed to public agricultural extension service. In this case, the responsibility to deliver extension is given to local governments with still public delivery and funding. This initiative is being taken to improve accountability by moving the services closer to the clients (Anderson & Feder, 2004). If the service provider is closer to the client to be served, problems will be better identified and site specific services can be provided rather than a blanket approach to extension. It is also easier to get appropriate feedback from the community to be served; and political commitment to support extension can also increase as the clients can create some level of pressure to leaders who are close to them. However, as Anderson and Feder (2004, p.50) reported in some countries where decentralization is attempted "political interference and use of extension staff for other activities such as election campaigns" were practical problems observed. Anderson and Feder (2004) suggest that a high level of decentralization, devolution, where responsibilities are given to farmers' associations and organizations will better serve the interests of farmers as it

develops a sense of ownership and also contribute to sustainability of efforts as the ultimate beneficiaries are involved directly.

*Fee for service* – in this arrangement, groups of farmers who have similar information needs contract for extension service and share costs among them. Extensionists, in accordance with the demand of the farmers, provide tailor-made information that suits the groups' context. The main drawback of fee for service arrangement is its automatic exclusion of poor farmers or any disadvantaged group such as women who cannot afford paying for the services. Under such circumstances Anderson and Feder (2004) suggest two things – either the public sector to continue providing the service for those marginalized groups or to fund them so that they can pay to get service from a fee for service arrangement.

*Farmers field schools* – these are participatory training and learning approaches on farmers' fields. Farmers Field Schools (FFS) were initially introduced in Indonesia to control rice pests through Integrated Pest Management (IPM) technique. FFS practices were later expanded to other Asian countries, Africa and Latin America (Anderson & Feder, 2004). The main trust of FFS is an enhanced accountability in extension service as a group of 20 – 25 farmers who interact continuously develop a sense of ownership, the strict timetable of training and learning sessions keep extensionists and farmers in business, and availability of scheduled supervisory service. In FFS, costs and financial sustainability for the intense farmer training are the drawbacks, particularly at the initial level of the FFS establishment through a support of outsider trainers. But, eventually, the group can be empowered and trainers can be selected out of the farmers themselves

(Anandajayasekeram, Davis & Workneh, 2007). Okorley, Gray and Reid (2008) argue on the importance of a shift from a one-to-one extension to group-based extension delivery. So, in that context, FFS are useful approaches to address needs of wide majority of farmers.

*Privatizing extension service* – with some intermediary arrangements, privatization of extension is geared towards a complete withdrawal of the public sector from the business of funding and providing agricultural extension service and its replacement with private extension funding and providing, or cost recovery, or commercialization of the service (Kidd, *et al*., 2000; Upton, 1992). There are several driving forces to advocate privatization vis-à-vis the public extension system; among which fiscal unsustainability, inefficiency in allocating resources, and administrative and political constraints in the public extension are commonly presented reasons by several authors (Farrington, 1994; Kidd, *et al*., 2000; Rivera, 1996, 1997; Rivera & Gustafson, 1991). "Matching between comparative advantages of organizations and the functions they perform" is, therefore, a critical concern in advocating about privatization (FAO & World Bank, 2000, p.15).

Privatization has, in fact, its own merit and demerit. As Lamers, *et al.* (1996) noted farmers in industrial countries have generally better agro-ecological conditions, better soil fertility, a higher level of mechanisation, better access to inputs and a more solid commercial structure for their farming systems than the farming population in the low-income countries. Owing to those favourable conditions, farmers of the industrialized economies, unlike their counterparts in the low-income countries, are more capable for paying for extension services. On the contrary, most of the farmers in developing

countries who operate farming under rain fed condition, often on ecologically diverse and undulating topography cannot afford paying for private extension service. In addition, it is also difficult to get a private extension agency that will be interested in delivering the services with a satisfactory result under those sub-optimal environmental conditions. The other problem that one can foresee is that a private extension system will say to farmers 'demand a service, and I give you'. In this case, the high rate illiterate farmers in the developing countries may not clearly visualize the importance of advisor-ship to 'file' a demand for service from private agencies. So, privatization in such circumstances does not work as one with a western experience may expect. For privatization to be implemented, as Rivera (2007) sceptically suggests, farmers need to be empowered first.

To sum up the argument on privatization with the phrase of Kidd, *et al* (2000, p.95), privatizing agricultural extension service in developing countries is a "*caveat emptor"*. With this concern, in many developing countries, public agricultural extension service provision will remain dominant for unpredictably long future. So, understanding it clearly and looking for mechanisms to fine tune the service towards the felt-needs of farmers is by far important.

At the same time it is also indispensable to understand that PAES is globally, as Collion (2004) argues, under increasing pressure owing to: i) state financial crises that forced public investment to reduce; ii) increasing criticism of poor performance of the PAES in terms of lack of accountability to clients, lack of relevance and quality of programmes, low competence levels of development agents, and limited coverage; iii) emergence of other actors and

service providers that disseminate agricultural knowledge and information such as producers organizations, NGOs and private sectors; iv) political forces linked to democratization, liberalization and decentralization which puts pressure to redefine PAES away from top-down and supply-driven approaches; v) revolution in ICTs and multiple sources of information; and vi) changes in agriculture and information needs of farmers. As a result of those pressures extension's mandate has been broadened. The service is expected to address marketing issues, environmental concerns, poverty reduction, and so forth in addition to the traditional agricultural knowledge and information transfer.

In summing up, owing to the generic problems of PAES itself and the changing roles it is expected to play, revitalizing the service, institutional pluralism, decentralization, privatization and demand driven agricultural extension are, therefore, on the agenda of international agricultural extension. This being on the wider scale of the globe, how effective the PAES is in Ethiopia is not systematically studied.

The aim of the present study was, hence, to assess farmers' and development agents' perceived effectiveness of the PAES with respect to facilitating contact of farmers with development agents; enhancing farmers' motivation, satisfaction, empowerment, and participation in extension; professional and technical competency of development agents; and availability of necessary support systems such as relevant extension packages, credit facility, supporting policy, research and subject matter supports. As to Leeuwis and Van den Ban (2004), knowledge and perceptions of actors shape their practices. Accordingly, the knowledge and perceptions of farmers shape

their decisions to implement extension packages promoted by the PAES, and knowledge and perceptions of development agents shape their behaviour in relation to helping farmers in matters of their needs.

## Problem Statement

In many developing countries, including Ethiopia, PAES is a dominant mode of service provided to farmers. The service is provided to clienteles with an ultimate social goal of enhancing their well-being through helping them learn "the ropes" and be responsible for their own actions in the final analysis. Having this role of extension in mind, different studies show that PAES is failing globally (Rivera, Qamar & Van Crowder, 2001) because of its unaccountability in taking the diverse ecological and socio-economic conditions of small farmers who often have to manage complex and risky farming systems.

More specifically, the PAES is criticised of being ineffective because of lack of relevant extension packages to demographically and economically different groups of farmers including gender, socio-economic status and agro-ecological diversity; lack of ownership by the intended beneficiaries as a result of poor participation in extension programme delivery processes; failure to take into consideration of local knowledge available in villages; limitations in the professional and technical competence of development agents; and poor support system from other institutions.

To overcome those multifaceted problems attributed to public agricultural extension, different countries have been taking a range of actions "from contracting with the private sector to provide extension services in order

to reduce costs and improve cost-effectiveness to drawing on private sector funding to improve the financial sustainability of extension" (Rivera, Qamar & Van Crowder, 2001, p.44). But, in Ethiopia, the PAES is a foremost mode of extension delivery for more than seventy years.

In Ethiopia, with respect to the long history of PAES provision, relevance of extension packages to the diversified groups of farmers; extent of participation of farmers and development agents in extension programme planning and delivery; professional and technical competences of development agents; and other institutional support levels to the PAES are not properly studied and documented. So, one cannot tell what the PAES is achieving from those points of view. The available limited studies mainly concentrate on adoption of technologies and extent of change that took place on farm with little insight into what farmers and DAs perceive of the effectiveness of the PAES. With still such a huge gap, both the federal and regional governments incur costs on the PAES.

So, the current study was undertaken to find out farmers' and DAs' perceived effectiveness of the PAES in line with the mission it is mandated. For a study with such a purpose farmers and DAs are, by virtue of their direct encounter with opportunities and difficulties of grassroots-level circumstances, the right people to be communicated and to learn about what is happening at the ground level. To carry out this study, the following objectives were set.

## Objectives of the Study

The general objective of the study was to examine farmers and DAs' perceived effectiveness of the PAES in Soddo-zuria *Woreda* of Wolaita Zone in Ethiopia. The specific objectives were to:

1. examine characteristics of both male and female farmers in terms of:
    - frequency of contact with DAs in a month as perceived by farmers;
    - motivation by the PAES as perceived by farmers;
    - satisfaction with the PAES as perceived by farmers;
    - empowerment through the PAES as perceived by the farmers; and
    - participation in PAES as perceived by farmers and the DAs.
2. assess the level of participation of DAs in the PAES.
3. examine professional and technical competences of DAs as perceived by farmers and the DAs themselves.
4. analyze availability of support systems as perceived by farmers in terms of:
    - availability of relevant extension packages;
    - timely availability of extension packages;
    - adequacy of available extension packages;
    - availability and adequacy of credit facility; and
    - availability of markets for agricultural produces.
5. assess availability of support systems as perceived by DAs in terms of:
    - availability of relevant extension packages;
    - timely available extension packages;

- adequacy of available extension packages;
- availability of markets for agricultural produces;
- availability of supporting policy for agricultural extension work;
- availability of research support; and
- availability of SMS.

6. determine perceived effectiveness level of the PAES as perceived by farmers and DAs.
7. determine the relationship between perceived effectiveness levels of the PAES and the independent variables as perceived by farmers and DAs.
8. find out if there was a difference in perceived effectiveness levels of the PAES among farmers in terms of:
   - sex;
   - age;
   - wealth status;
   - educational status; and
   - location.
9. establish best predictors of effective extension service as perceived by farmers and DAs.

## Variables of the Study

The study examined farmers and DAs' perception of the effectiveness of the PAES in addressing farmers' problems and needs. So, 'effectiveness of the PAES' was the dependent variable. On the other hand, farmers' given and

extension-induced characteristics; DAs' professional and technical competences; DAs' participation in extension; and levels of support systems to the PAES were the independent variables.

## Research Questions

Research questions are interrogative statements formulated in specific manners in line with the purpose of a study. They provide a framework for a study, and help the researcher to be focused during the investigation by delimiting the boundaries of the research and determining the types of data to be collected. Schilling (2000) argues that effective undertaking of a research work involves asking right questions.

Onwuegbuzie and Leech (2006) assert that research questions can be formulated based on theories, past research work, previous experience, or a practical need to make an informed decision in the work environment. The research questions in this study were formulated based on a mix of the four different sources. Accordingly, the specific questions of the study were:

1. What are the characteristics of both male and female farmers in terms of:
    - frequency of contact with DAs in a month as perceived by farmers;
    - motivation by the PAES as perceived by farmers;
    - satisfaction with the PAES as perceived by farmers;
    - empowerment through the PAES as perceived by farmers; and
    - participation in the PAES as perceived by farmers and DAs?
2. What is the level of participation of DAs in the PAES?

3. What are the levels of professional and technical competences of DAs as perceived by farmers and the DAs themselves?
4. What are the levels of supports to the PAES as perceived by farmers in terms of:
    - availability of relevant extension packages;
    - timeliness of availability of extension packages;
    - adequacy of available extension packages;
    - availability of credit facility; and
    - availability of markets for agricultural produces?
5. What are the levels of supports to the PAES as perceived by DAs in terms of:
    - availability of relevant extension packages;
    - timeliness of available extension packages;
    - adequacy of available extension packages;
    - availability of markets for agricultural produces;
    - availability of supporting policy;
    - availability of research support; and
    - availability of subject-matter support?
6. To what extent is the PAES effective as perceived by farmers and DAs?
7. What are the relationships between perceived effectiveness levels of the PAES and the independent variables as perceived by farmers and DAs?
8. Is there a difference in effectiveness levels of the PAES among farmers in terms of sex, educational status, wealth status, and location?

9. Is there a difference between farmers and DAs in perception on the effectiveness of the PAES?
10. What are the best predictors of effective extension service as perceived by farmers and DAs?

Those research questions were systematically dealt with; and owing to the prime focus and interest in the research, the following hypotheses were put forward for testing.

**Hypotheses Formulated for the Study**

1. $H_o$: Farmers' level of participation in extension does not have any relationship with their rating on effectiveness of the PAES.

   $H_1$: Farmers' level of participation in extension has a direct relationship with their rating on effectiveness of the PAES.
2. $H_o$: There is no difference in rating on professional competence of DAs between farmers and DAs themselves.

   $H_1$: There is a difference in rating on professional competence of DAs between farmers and DAs themselves.
3. $H_o$: There is no relationship between level of relevance of extension packages and effectiveness of the PAES as perceived by farmers and DAs.

   $H_1$: There is a relationship between level of relevance of extension packages and effectiveness of the PAES as perceived by farmers and DAs.
4. $H_o$: There is no difference in ratings on the effectiveness of the PAES between male and female farmers.

$H_1$: There is a difference in ratings on the effectiveness of the PAES between male and female farmers.

5. $H_o$: There is no difference in ratings on the effectiveness of the PAES among farmers of the three wealth categories.

   $H_1$: There is a difference in ratings on the effectiveness of the PAES among farmers of the three wealth categories.

6. $H_o$: There is no difference in ratings on the effectiveness of the PAES between illiterate and literate groups of farmers.

   $H_1$: There is a difference in ratings on the effectiveness of the PAES between illiterate and literate groups of farmers.

7. $H_o$: There is no difference in ratings on the effectiveness of the PAES among farmers of the three sub-agro-ecologies.

   $H_1$: There is a difference in ratings on the effectiveness of the PAES among farmers of the three sub-agro-ecologies.

8. $H_{o:}$ There is no difference in rating on the effectiveness of the PAES between farmers and DAs.

   $H_1$: There is a difference in rating on the effectiveness of the PAES between farmers and DAs.

9. $H_o$: The multiple correlation coefficient (R) is zero.

   $H_1$: The multiple correlation coefficient (R) is different from zero.

## Significance of the Study

This study has various significances. First, it helps the Soddo-zuria *Woreda* Agriculture and Rural Development office, and the Ministry of Agriculture and Rural Development, at large, to get feedback on the

effectiveness of the PAES as perceived by farmers and DAs. Accordingly, the research results will help to fine tune policy directions regarding extension provision in the study area and other areas with similar contexts.

Second, other institutional bodies such as universities, research institutes, agricultural and technical vocational training institutes (ATVTs), and farmers training centres (FTCs) can utilize the result in their endeavour of relating their routine activities with the real life situations of rural communities.

Third, in the study perceptions of male and female, educated and non-educated, and poor and better off farmers have been assessed by disaggregating some of the most relevant results. Such an approach helps to capture disparities owing to gender, education and economic backgrounds of farmers. In this regard the study partly addresses the Millennium Development Goals (MDGs) of the country; in a sense, understanding the performance of the PAES as perceived by different extension-clienteles helps to design development interventions that reflect the felt needs of the groups.

Fourth, the study increases the body of knowledge in extension and addresses some gaps in public extension approaches and management. Many of the extension related studies so far, particularly in the Ethiopian context, are on levels of adoption of technologies. So, this particular study which emphasizes perception of grassroots level stakeholders such as farmers and DAs is of timely.

## Delimitation and Limitations of the Study

Owing to resource limitations (money, materials and time), the study was delimited to one *Woreda* (equivalent to district), Soddo-zuria, though such a study could have a higher practical merit if it were conducted on a regional or nationwide basis.

This study has three limitations. First, the study is a cross-sectional survey. It, unlike longitudinal and cohort-sequencing studies, does not show trends of developmental changes in the characteristics and themes of the investigation. However, as a thesis work which has a short life span, a cross-sectional study is important as it is relatively quick and less expensive.

Second, the fact that the study is delimited to one *Woreda* automatically limits the degree of generalization of the findings to the region or the country. Therefore, necessary care needs to be taken in all attempts of using the findings of the study.

Third, as the farmers do not keep records of the achievement of the PAES, the data collected were based on their memory recall. This means that the authenticity of the data collected is based on the extent to which the respondent farmers could recall their experiences from memory.

## Definitions of Key Concepts

Concepts “are labels for ideas”. Those labels, in many instances, may have “resonance” that may go beyond the meaning of the ordinary word or phrase. This resonance, actually, depends on the context of use of the specific word or phrase in consideration (Tight, 2002). Owing to variations in meanings of concepts across time and space for people of different

background and interest, mutual understanding and commonality will be low. In other words, there could be multiple realities as a result of social constructions and attaching varied meanings to terms, phenomena and issues by actors in a network of sharing information. This, in turn, may lead to misunderstanding and confusion among parties involved in the communication transaction. So defining terms is important for maximizing understanding among social actors.

Basically, terms can be defined in three ways – as a dictionary defines a term, by giving examples, or by defining in a context the writer wants it to be understood by the audience (Whitley, 1996). In research works, the latter is referred to operational definition.

Accordingly, operational definitions have been given for some terms believed to lead to confusion among audience in this study.

***Agricultural extension***: refers to 'a service provided to farmers as a policy instrument to accelerate technological and institutional innovations, enhance inspirations, induce change (both in behaviour and farm) and build human capacity mainly through education and training'.

***Competency of a development agent***: is an underlying characteristic or behaviour that the agent needs to demonstrate. It could be motive, trait, skill, aspect of self image or social role, or body of knowledge which one uses (Boyatzis, 1982, cited in Khalil, *et al*., 2008). In other words, competency of a development agent is the capability that the agent brings to the job situation as required by the job tasks. This, in general, refers to knowledge and skills of the development agent in human development; leadership; communication;

participatory extension programme development, delivery, monitoring and evaluation.

***Effectiveness****:* Microsoft Encarta Dictionary (2007) defines the term 'effective' in relation to producing a desired or intended result. Prokopenko (1987), cited in Misra (1997, p.9), also defines effectiveness as "the degree to which goals are attained". In the present context, effectiveness of the public agricultural extension service is seen from the point of view of carrying out the expected roles in addressing farmers' developmental needs, priorities and problems. More specifically, effectiveness is understood in this work in relation to the public agricultural extension's success in changing farmers' awareness, knowledge, skills, aspirations, involvement, motivation, satisfaction, access to information, and enhancing farm productivity.

***Empowerment***: this concept is used in different ways depending on the focus of writers. In this work, the term refers to farmers' access to information, their ability to make informed choices, level of assertiveness and self-esteem as a result of participating in extension educational programmes.

***Farmers' satisfaction in extension***: refers to the way they feel about the extension programme delivery in terms of benefiting them.

***Motivation*****:** refers to any incentive mechanisms (mainly in non-monetary terms) given to and acquired by farmers to enhance their enthusiasm and commitment to participate in extension educational programmes and develop the necessary knowledge, skills and attitude.

*N****eed assessment***: refers to a systematic process of setting priorities and making decisions on programme planning, development and operations in extension. In other words, it is a process of determining a gap between "what

is" and "what should be" in terms of outcomes of extension programmes and priorities of farmers' needs (McCaslin & Tibezinda, 1997, p.39).

***Perception*:** refers to the attitude and understanding of farmers and DAs on the effectiveness of agricultural extension according to information they acquired through observation and participation in extension educational programmes.

## Study Area

The study was conducted in Soddo-zuria *Woreda* (equivalent to a district). Ethiopia is divided into 9 regions and two city administrations. Southern Nations, Nationalities, and Peoples' Regional State (SNNPRS), located in the Southern part of the Country as its naming indicates, is one of those nine regions. In this region there are 13 Zones (sub-regional administrative units) and 8 Special *Woredas (*equivalent to district*)*. Wolaita Zone is one of those 13 Zones. In Wolaita Zone there are 12 *Woredas*. Soddo-zuria *Woreda,* where the study was conducted, is one of them (GFDRE, 2008).

To elaborate some of the features of the Zone, geographically, Wolaita Zone is located in two watersheds - Omo-Gibe and Rift Valley Lakes; other watersheds in the Region being Baro-Akobo and Genale-Dawa. If one takes a proportion, 58% and 42% of the areas of the Zone lie in the watersheds of the Omo-Gibe and the Rift Valley Lakes, respectively. The total area of the Zone is about 4103 $km^2$ (SNNPRS, 2000E.C/2008).

The altitude of the Zone ranges from 900 to 2100 metres above sea level. Traditionally, three major agro-ecologies are identified in Ethiopia – *Kolla, Woinadega,* and *Dega* according to altitudinal ranges, types of climate

and agricultural activities; mainly those three agro-ecological classifications refer to cold, mildly cold/warm, and hot areas, respectively. In Wolaita Zone 35 percent is Kolla, 56 percent and 9 percent are Woinadega and Dega, respectively. In those three major agro-ecologies more than 1.5 million people live in the Zone. The Zone is a highly populated area of the country, with 390 people per square kilometre (GFDRE, 2008; Getahun, 1984; SNNPRS, 2000E.C./2008). The regional average population density is 110.2 persons per square kilometre (CSA, 1998).

Soddo-zuria, the *Woreda* selected for the study, has a population size of 163,771 (GFDRE, 2008). The study was undertaken specifically in this *Woreda* of Wolaita Zone because of an interest of the researcher in drawing lessons from an area with the following characteristics: i) the *Woreda* exhibits the three major agro-ecologies (cold, mildly cold/warm, and hot climatic zones) as a result of the presence of mount Damota and low lying land masses. Lessons drawn from an area of like this may have relatively wider implications for the region and the country, at large, as those agro-ecological characteristics are common in wider parts of Ethiopia; ii) Soddo-zuria *Woreda* is one of the densely populated areas within Wolaita Zone (GFDRE, 2008; Getahun, 1984; SNNPRS, 2000E.C/2008). In such an area agricultural production increment through putting more land into cultivation has almost reached its maximum and necessitates an intensified innovative approaches rather than area expansion and exploitation of existing natural resources. This has to come mainly through provision of extension service to farmers and improving their decision-making power. This situation alerted the researcher to study how the PAES is doing in that aspect; iii) Soddo-zuria is one of the

privileged *Woredas* in the Region where agricultural extension activities have been conducted for many years with different intensity and coverage (Gebremedhin, Hoekstra & Tegegne, 2006; Kassa, 2003; Tessema, 2000).

Figure 1 shows the relative location of SNNPRS in Ethiopia, Soddo-zuria *Woreda* in SNNPRS, and the sample sites in the *Woreda*. On the bottom part of the map the numbers on the horizontal and vertical axes indicate the longitudinal and latitudinal ranges in which the *Woreda* is located.

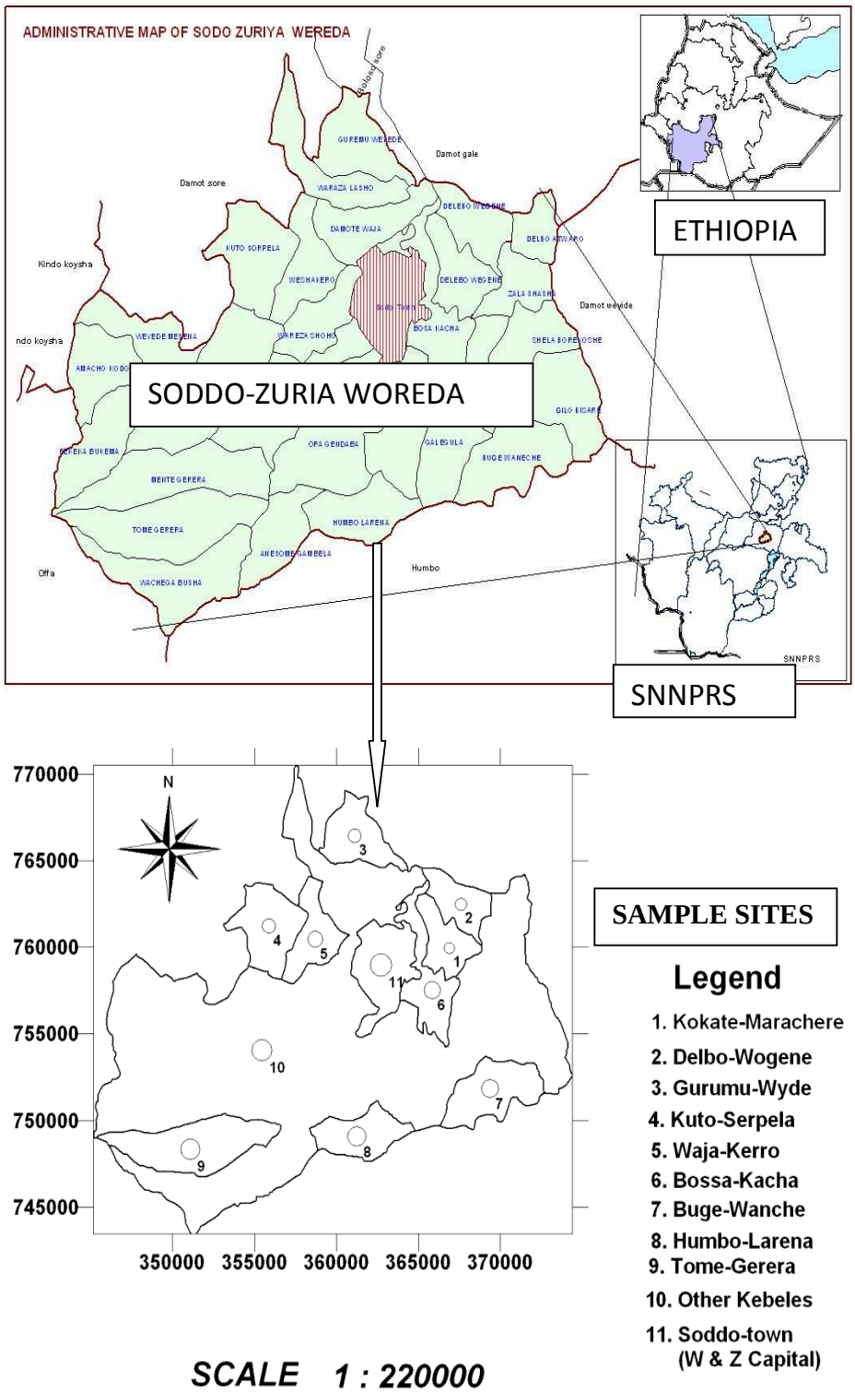


**Figure 1: The Study Area Showing Sample Sites**

Source: GFDRE (2008); Sample sites constructed by the researcher

## Organization of the Thesis

The thesis is organized into five chapters. Chapter One has already set the background of the study. Chapter Two presents the literature review and the conceptual framework. Chapter Three is about the methodology. Chapter Four presents and discusses the findings of the study. Lastly, in Chapter Five summary of the study, conclusions, policy recommendations and suggested areas of research have been presented.

# CHAPTER TWO

# REVIEW OF LITERATURE

## Introduction

In this chapter, literature review on agricultural extension have been presented and analyzed. First, an attempt is made to develop a common understanding on the discipline of agricultural extension. This is followed by a brief account of its historical development both worldwide and specifically in Ethiopia. Scope of agricultural extension, its purpose and problems encountered in the course of its development have also been summarized. Changing paradigms observed in the discipline in courses of time have also been discussed. This is followed by some theories relating to effectiveness in agricultural extension. Finally, a conceptual framework of the study is presented and discussed.

## Meaning of Agricultural Extension

The term 'agricultural extension' is difficult to define precisely as it has different meanings at different times, in different places, and to different people (Government of the People's Republic of Bangladesh (GPRB), 1996). Definition of agricultural extension could also vary in accordance with a 'normative' or an 'intervention' approach of the writers (Leeuwis & Van den Ban, 2004, p.24). In a normative approach, people define extension in relation

to what the service is supposed to achieve; whereas, in an intervention approach, extension is defined in relation to what specific tasks the development practitioners such as the development agents should do.

To demonstrate how the meaning of agricultural extension vary in time and interest of emphasise of writers, several definitions have been given in a seemingly chronological order below. Brunner *et al*. (1950) and Bradfield (1966) understand agricultural extension as an application of both physical and social sciences to the daily routines of farming, homemaking, and family and community living with an objective of improving efficiency. Saville (1965) sees agricultural extension as an out-of-school education for rural people. This view is also shared by Obibuaku (1983), quoted in Nwachukwu (2005).

Maunder (1972) defines agricultural extension as a service which assists farm people through educational procedures in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting social and educational standards. Adams (1982) focuses on problem identification, analysis and awareness creation role of agricultural extension. Röling (1988), on the other hand, accentuates the public or collective utility and professional communication intervention nature of agricultural extension that is deployed by an institution. He also underlines extension's role in inducing voluntary behavioural change among target groups. Van den Ban and Hawkins (1996) emphasize the conscious use of communication of information to help people form sound opinions and make good decisions in their activities. In their approach, extension's role is to change peoples' behaviour. Change on farms is the responsibility of the users of extension. Nagel (1997) specifically stresses the

purposive transfer of skills to farmers and organized exchange of information as the main roles in agricultural extension. The Neuchatel group (1999) conceptualizes agricultural extension as a way of facilitating the interplay and synergy within a total information system involving agricultural research, agricultural education and a vast complex of information-providing businesses. LBL, Landwirtschaftliche Beratungszentrale /Swiss Centre for Agriculture Extension/ (2003, p.3) gives a pragmatic definition of agricultural extension as "support farming families and rural communities in making the best possible use of the resources at their disposal". Leeuwis and Van den Ban (2004, p.27) define agricultural extension as "... a series of embedded communicative interventions that are meant, among others, to develop and/or induce innovations which supposedly help to resolve (usually multi-actor) problematic situations". In a study by Khalil *et al*. (2008), agricultural extension is understood as a professional communication intervention deployed by organisations to disseminate agricultural knowledge and technologies to rural communities.

The foregoing definitions show that there is no one universally accepted meaning for agricultural extension. As LBL (2003, p.3) puts it:

> People who are involved in extension – from policy makers and national extension planners to field extensionists and farmers – have many different understandings of the purpose, the functions and the tasks of extension. The understanding of what extension is may range from a vehicle for transferring modern technology from research to farmers, to a strategy for broad-based participatory community development.

LBL (2003) conceptualizes agricultural extension with an analogy of two lenses that have different focuses. One of the lenses is with a narrower focus and helps to see only the extension organization and the clients to be served; the other lens is with a wider focus and helps to see extension in relation to the context where it operates. So, depending on the lens one is using, the definition can be narrow or wide. However, it can be argued that all the definitions given show implicitly or explicitly the five common elements that were provided by Röling (1988) two decades ago: (1) extension is a goal-oriented intervention, (2) extension uses primarily communication to induce the desired change, (3) extension can be effective only through a voluntary change of behaviour, (4) extension seeks stratification of clients for effective service, and (5) extension is deployed by an institution.

Another important observation in the various definitions given above is a move from more transfer-oriented to a concern for a room for clients' involvement in the process as one follows the definitions in a chronological order. Today, farmers and rural communities have very complex needs of extension. Thus, the trend in the definition of extension is in line with Van Beek's (1997) assertion of direct relationship between 'increasing complexity' and 'increasing people orientation' in the definition and work of extension.

In this research work, in line with the objectives of the study, agricultural extension is defined in a more pragmatic way as 'a service provided to farmers as a policy instrument to accelerate technological and institutional innovations, enhance inspirations, induce change (both in behaviour and farm) and build human capacity mainly through education and training'.

## A Brief Account of the Historical Development of Agricultural Extension

Agricultural extension has a very long history that is built in adult education, communication studies, community and rural development, and international development (Karbasioun, *et al.*, 2007b). The service has been created, adapted and developed over centuries. Its evolution extends over four thousand years (Jones & Garforth, 1997). Jones and Garforth (ibid), quoting Bne Saad (1990), and White (1997), claim that the pioneer examples of extension works were the discovery of clay tablets in Iraq, the then, Mesopotamia and the hieroglyphs in Egypt. On the clays, advices were inscribed on how to water crops and get rid of rats around 1800 B.C. The hieroglyphs in Egypt included advices on avoiding crop damage and loss of life from the Nile's flood.

An important advance in agricultural writings was also reported alongside the ancient Greek and Phoenician civilizations which were later adapted by the Roman writers. Several Latin texts, drawing on practical farming experience, were written between the second century B.C. and the fourth century A.D. (Jones & Garforth, 1997).

In China, during the various dynasty systems from 25-1912 A.D., institutional supports were given to farmers in the form of relevant agricultural research, dissemination of information and advice. Particularly, the invention of woodblock printing in that period has believed to play a major role in the production of practical handbooks on agriculture and sericulture (Bray, 1984; Delman, 1991).

Close to the modern history, an effort of a British politician, Lord Henry Brougham, who was interested in extending relevant and useful

information to adult population, is well documented. Brougham established the “Society for the Diffusion of Useful Knowledge” in 1826. Similar other societies were also established in other European countries, India, China, Malaysia, and the United States before 1840s. The term "extension" was, however, first used in 1867 when universities of Oxford and Cambridge attempted to meet the educational needs of people near to their home in the form of university extension. The growth and success of such works in Britain eventually influenced some other countries, especially United States of America. In USA, similar out of college lectures were organized by 1890s which later became a formal activity of the land-grant colleges (Jones & Garforth, 1997).

In the sense of modern agricultural extension service, the response of the Royal Agricultural Improvement Society of Ireland (founded in 1841) to the severe outbreak of potato blight in Ireland in 1845, historically known as the potato famine and lasted until 1851, is well recorded. To respond to such a crisis, the Society appointed itinerant lecturers to advise small farmers on how to improve their cultivation and grow other root crops. Such practices were eventually adopted in Germany, France, Denmark, the Netherlands, Italy, Switzerland, Austro-Hungarian Empire, Russia, United States, and Canada. In the last two countries, agricultural societies were common in the first half of the nineteenth century (Jones, 1981).

In the United States, the Morrill Act of 1862 and the Farmers’ Institute Movement have played significant role in the evolution of agricultural extension. The Morrill Act signed by President Lincoln was believed to play pivotal role in the creation of state colleges of agriculture and mechanical arts;

and the land-grant provisions have enabled the states to establish and fund colleges. The Farmers' Institute Movements that became popular after 1860 were responsible for organizing a one or two-day long meetings for farmers. In those institutes, the visiting speakers were mainly professors at the state colleges of agriculture. In 1887 the Hatch Act further stimulated the formal establishment of experimental fields of the state colleges of agriculture; and in 1914 with the passage of the Smith-Lever Act, the Cooperative Extension Service of United States was established with an objective of disseminating practically useful information on agriculture and home-economics to rural people (Jones, 1981).

In Canada, farmers' institutes were established in 1885 and other advances similar to that of the United States were made (Blackburn & Vist, 1984). In Australia, Black (1976) and Logan (1984) have recorded various efforts in agricultural extension work and establishment of agricultural societies in the second half of the nineteenth century. In Japan, agricultural extension service provision was started in 1900 (Tajima, 1991).

In the tropics, agricultural extension works were mainly started with the European colonial powers with the objective of improving agricultural products as inputs for their own agro-processing industries. By then, agricultural activities that have only local merit were not of interest for the colonial powers to organize extension service. However, later with the creation of departments of agriculture in various developing countries and appointment of agricultural professionals, different efforts were made to improve locally important food crops. For example, Jones and Garforth (1997) quoting Mook (1982), Arasasingham (1981), Masefield (1950), and Willis

(1922) documented the various forms of efforts made and the establishment of departments of agriculture in the nineteenth century in Sri Lanka (Ceylon), India, several Caribbean Islands, and some countries in West Africa.

The development of agricultural extension was evolutionary to reach to its present level profession. A profession is, as Shadish *et al.* (1991) understand, a unique field of study with transmittable knowledge base. Agricultural extension, to become a unique profession of assisting farmers through an educational process to develop their own self-helping mechanisms has come along all those historical routes.

## History of Agricultural Extension in Ethiopia

In Ethiopia, the history of agricultural extension efforts goes back to the 1930's. The earliest record was on agricultural extension demonstration activities that were carried out in the surroundings of Ambo Agricultural College in 1931. The demonstration activities were undertaken to train students and to show the potential of improved agricultural technologies to farmers (Gebremedhin, Hoekstra & Tegegne, 2006).

However, organized agricultural extension service to farmers was reported to start in 1943 with the independent establishment of the Ministry of Agriculture which was till then amalgamated with the Ministry of Commerce and Industry. Even by then, different services were organized under different departments of the Ministry. It was, hence, the 1950's that is documented as a time when real agricultural extension work began following the establishment of the Imperial Ethiopian College of Agriculture and Mechanical Arts, IECAMA (now Haramaya University). The College was established with the

assistance of the United States of America. Accordingly, the College's activities were modelled on the Land Grant College system with three fundamental responsibilities, i.e., educating agricultural professionals, conducting agricultural research and disseminating appropriate agricultural technologies. The extension mandate of the College was mainly to transfer local research outputs and technologies to farmers and to import improved technological packages from abroad and test them for relevance in the country (Kassa, 2003; Ibrahim, 2004, cited in Gebremedhin, Hoekstra & Tegegne, 2006). Following the experiences of IECAMA, research and extension efforts were made by three other agricultural colleges - Awassa, Ambo and Jimma (Kassa, 2003).

The sufficiency of the extension service provided to farmers by the colleges was, however, very minimal both in terms of coverage and intensity. The vast majority of the farmers were not getting extension service. In 1963, having recognized the gap, the Government of Ethiopia transferred the mandate of providing agricultural extension service to the Ministry of Agriculture (MoA). Since then, the MoA has been responsible for extension activities (Kassa, 2003).

The Ethiopian agricultural extension delivery system, though it varies from region to region, includes: packages on cereals, livestock (dairy, fattening, poultry and livestock feed), high economic value crops (coffee, oil crops, pulses, vegetables and spices), improved post-harvest technologies (handling, transport and storage), agro-forestry, soil and water conservation and beekeeping. The various packages are developed for the different agro-ecological zones, i.e., highland mixed farming system, highland-degraded and

low moisture, lowland agro-pastoralist and lowland pastoralist zones (Kassa, 2003).

Regrettably, the agricultural production system and the livelihood situations of farmers have not shown meaningful changes though the history of extension service provision is long. The agricultural system is found still at its subsistent and archaic level, and the livelihood situation of rural households is so low. In fact, low productivity, heavy reliance on obsolete farming techniques, poor efficiency of extension and low levels of credit support are, among others, documented to be characteristic features of Ethiopian agriculture (Arega & Rashid, 2003; Kassa, 2003).

## Scope and Purpose of Agricultural Extension and Problems Encountered through its Course of Historical Development

Extension includes all aspects of activities from understanding client needs, developing a plan, appointing staff, implementing and monitoring programmes to evaluating impacts (RIRDC, 2003). In supplying the service, multi-institutional arrangements can be made. These include public provisioning (typical mode of extension supply in many developing countries); private (Chile, Costa Rica, Britain, France, and New Zealand); decentralized, mixed public and private service (China); farmer driven provisioning (Uganda); extension by private companies (Australia); provision by groups of companies-producer associations (Zimbabwe); extension provision for share-cropping farmers (China); commodity organizations (Australia); non-government organizations and farmer organizations in many developing countries (ESSDN, 1995; Haug, 1999; Leeuwis, 2004; RIRDC, 2003).

In Ethiopia, transforming the subsistent-oriented agricultural production system into market-orientated production system is a main agricultural development strategy of the Government. In this effort, the public agricultural extension service is entrusted to spearhead the transformation process (Gebremedhin, Hoekstra & Tegegne. 2006).

Fleischer, Waibel and Walter-Echols (2002) argue that agricultural extension service provisioning by public agencies was institutionalized in many developing countries to stimulate rural development in the context of state-led, planned modernization of the economies of the respective nations. Likewise, in Ethiopia, provision of public agricultural extension service is clearly reflected in the strategy of Agricultural Development Led Industrialization (ADLI) as the agricultural sector is the backbone of the country's economy (GFDRE, 1994E.C/2002). Owing to this, both the federal and regional governments incur high costs in the PAES.

In developed nations, agricultural extension service provision is being mainly privatized because of the relatively low contribution of agriculture to economic growth, high level of education among farmers, the use of high amount and variety of externally purchased inputs, advancement of electronic information, and the fact that producers are closely linked and integrated with research systems. These are not the cases in Ethiopia like in many developing countries.

In all processes of extension educational programmes, the primary and intended focus is on helping farmers to improve their knowledge, skills and attitudes, and bringing about enhanced aspirations and desired behaviour. According to ESSDN (1995), in a learning process the function of extension is

not merely to transfer technology but to ensure two-ways flow of information with the aim of empowering farmers through knowledge rather than issuing technical prescriptions. However, in many instances, the PAES is criticised of achieving little impacts in those respects (Campbell, 1999; Farrington, 1994; RIDC, 2003). Goss (1994) and Carney (1998), as cited in RIRDC (2003), argue the failure of the PAES in terms of lack of relevance of the programmes and incompetency of extension staff. Anandajayasekeram, *et al.* (2005) ascertain the failure of the PAES from the point of view of scope of coverage; according to them, only about 10 percent of potential beneficiaries are served; out of this figure, the proportion of women beneficiaries is even much smaller.

ESSDN (1995) also summarizes the significant shortcomings of a PAES as unresponsiveness to the variation in farmer needs; lack of ownership by the intended beneficiaries; failure to reach poor and women farmers; limitations in the quality of field and technical staff; and high and unsustainable public costs as compared to benefits gained.

Historically, agricultural extension delivery system dwells on boosting production through the adoption of technologies (Röling, 1988). This was practically observed in Ethiopia (Berhanu 2008; Kassa 2003; Arega & Rashid 2003). Leeuwis and Van den Ban (2004, p.50) refers to such an approach of extension 'instrumental model of communicative intervention'. The focus in this approach is to persuade as much as possible many farmers to adopt a technology at one's disposal rigidly with little or no flexibility and adaptation to contexts; in other words, instrumental model of communicative intervention emphasizes change on a farm giving little attention to the learning processes that take place in the main actors of the change process - the farmers. The

alternative form of extension approach is ‘interactive communicative model of intervention’ (Leeuwis & Van den Ban, 2004, p.55). In this model of intervention, development processes are managed through negotiation and social learning among involved stakeholders.

## Changing Paradigms in Agricultural Extension Service

At present, the commonly shared understanding among extension personnel is that extension agencies need to exercise a more proactive and participatory approach and serve as knowledge and information "brokers", and facilitate mutually meaningful and equitable knowledge-based transactions among farmers, trainers, agricultural researchers and other concerned stakeholders (Bie 1996; Gebremedhin, Hoekstra & Tegegne, 2006). However, to reach to such a paradigm, extension has gone through different courses in the history of its development. In different extension communications, four different models of extension have been often cited by different authors – the typical developing country extension system, the training and visit system, the farming systems research and development model, and the United States Cooperative Extension system (see, for instance, Boone, 1989; Anandajayasekeram, *et al.*, 2008). These models are briefly summarized as follows.

### Typical Developing Country Extension System

This system of extension is characterized by its unidirectional focus from top to bottom. It exists apart from research and teaching institutions being mainly entrenched as a part of the ministry of agriculture. The system

has few bureaucratic linkages with other relevant agencies to facilitate learning in farmers and to transfer technologies. Boone (1989) underlines that such a system is subject to intensive political control and the professionals are expected to perform a wide range of duties that include both regulatory and educational functions.

## Training and Visit Model

The training and visit model, often abbreviated as "T&V" (Boone, 1989), was developed by Daniel Benor and was adopted by the World Bank in the late 1970's for its extension activities in many developing countries (ESSDN, 1995). T&V is characterised by four worth noting features – intensive training for development agents on specific agricultural practices combined with farm visits; simple direct linkage between governmental agricultural extension agency and the development agents; existence of teams of subject-matter specialists who support the agricultural extension officers; and development agents carry out only extension responsibilities. They do not involve in regulatory duties unlike the typical developing country extension system.

## Farming Systems Research and Development Model

According to Shaner *et al*. (1982), cited in Boone (1989), the farming systems research and development model consists of five major activities – identifying the target and the research area; problem identification and development of the research base; designing on farm research; implementing and analyzing on-farm research; and dissemination of results. In all these

processes, understanding farmers' life situations and the dynamic nature of farm household systems is the focus of farming systems research, extension and development approach.

## United States Cooperative Extension System

The United States cooperative extension system is undertaken by the land grant institutions that have a triple responsibility – teaching, research and extension. Funding and controlling of the extension system is a cooperative responsibility of the federal, state and local governments (Boone, 1989).

In carrying out extension activities under any of the four major models of extension, the emphasis placed could be on various paradigms such as human resource development, technology transfer, giving priority for the farmer, participation, empowering the clients, providing advisory service, and/or sustainable agricultural development. These features have been further elaborated below.

*Human resource development paradigm:* good examples for this paradigm are the early extension works of universities such as Oxford and Cambridge that attempted to give training to rural people who were not in a position to attend schools because of low economic situations and poor awareness on the value of education (Jones & Garforth, 1997).

*Technology transfer paradigm:* it involves a top down approach. This paradigm was particularly dominant before the 1970's. However, the training and visit system of extension which was developed and applied in different countries after the 1970's was also a good example of the transfer of technology paradigm.

*Farmer first paradigm:* this paradigm evolved as a result of dissatisfactions with the transfer of technology paradigm. Mere transfer of technology without a due concern of the farmers' situation led to failure of development programmes owing to variations in contexts between where the technology was developed and where it was tried to be "grafted". Robert Chambers was one of the prominent advocator of "the farmers first" approach (Chamber *et al*., 1989). In this model farmers are expected to play the primary role with a little input from outsiders as coordination and facilitation.

*Participatory paradigm*: the need for cooperative work, participatory technology development and recognition on the importance of interdependent functioning were the basis for the emergence of the participatory paradigm. This paradigm sees research, extension and development work as interwoven and interactive components of a wider system.

*Facilitation for empowerment paradigm:* this paradigm gives high value to experiential learning and farmer-to-farmer learning processes. Farmers' field schools and participatory technology development are important examples in this paradigm. In this paradigm of extension, farmers are encouraged to make their own independent decisions.

*Advisory work paradigm:* this paradigm refers to a situation where a government or private consulting firm responds to farmers' enquiries with technical prescriptions.

*Sustainable development extension paradigm:* Allen, *et al.* (2002) conceptualize this paradigm as a process of engaging all stakeholders in a learning and adaptive management for negotiating how to move forward in a complex world.

Haug (1999), citing Pretty and Chambers (1993), categorize the different extension paradigms and theories into four stages, i.e., production, economic, ecological and institutional stages. The production stage refers to the conventional top-down and one way transfer of technology model that was dominant in the period 1900 – 1975. In this paradigm the focus was on boosting crop and animal production. In this sense, agriculture is seen as a technical income generating activity and farmers as mere recipients of technologies promoted. The economic stage refers to the period 1975 – 1985 when farming systems research and extension was dominant being pioneered by economists. The ecological stage refers to the period 1985 – 1995. This was the time agro-ecological discourses dominated the development agenda. In this paradigm farmers are seen both as causes and victims of environmentally unsustainable development efforts. The last one, the institutional stage refers to the period 1995 – on wards. In this paradigm development professionals and practitioners are fully convinced that farmers' full collaboration in research and extension and functional linkage with other relevant stakeholders is vital approach in bringing about meaningful change in agriculture and the livelihoods of people.

In summing up, the various paradigms are not mutually exclusive in everything. There are some elements of overlap in them. However, they can help us to comprehend how extension delivery systems were and are shaped by the prevailing paradigms of the time.

## Theories to Study Effectiveness in Agricultural Extension

Effectiveness in extension can be assessed using different theoretical frameworks or models. At present, there are multitudes of theoretical frameworks and models as there are multitudes of definitions for agricultural extension. Those theoretical frameworks help to depict different things according to ones area of interest and emphasis. Here, an attempt was made to summarize the main tenets of some six theoretical frameworks or cluster of frameworks that were developed by different writers in different times, i.e., – Bardsley's way of conceptualization of extension, Van den Ban and Hawkins' linear model of extension, Deshler's contextual understanding of extension, adult learning theories, FAO and World Bank's agricultural knowledge and information system, and the extension butterfly model of LBL, Landwirtschaftliche Beratungszentrale Lindau (Swiss Centre for Agriculture Extension). Each of these theoretical frameworks has been elaborated below.

### Bardsley's Way of Conceptualizing Agricultural Extension

Bardsley (1982) as cited in Van den Ban and Hawkins (1988), conceptualizes extension as Figure 2 indicates. Here, the role of agricultural extension is to extract knowledge and information from the different agencies within the pool and provide it to farmers. The model implies importance of a two-way communication between the development agent and the farmers for appropriate feedback.

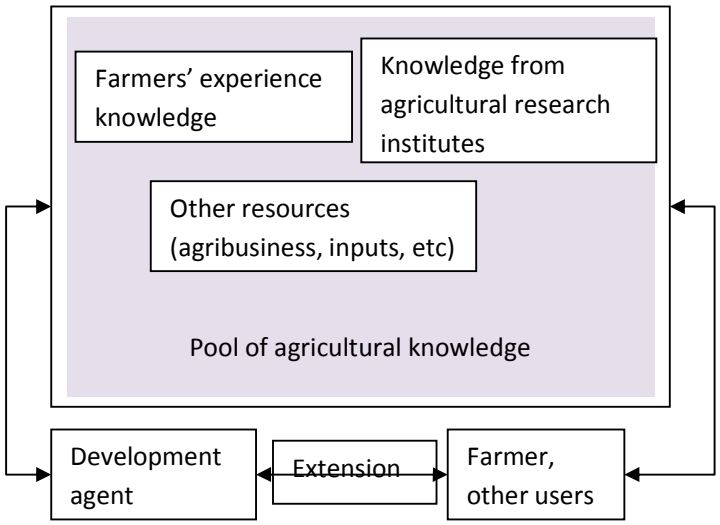


**Figure 2: Bardsley's Way of Conceptualizing Extension**

Source: Adapted from Van den Ban and Hawkins (1988, p.31)

Farmers are expected to develop capacity to directly interact with the various agencies within the pool of agricultural knowledge. In such an approach, effectiveness of extension is primarily assessed from the points of view of transmitting knowledge and information to the farmers and enhancing their awareness towards interacting with other relevant agencies.

In the original model, the constituents of the pool of agricultural knowledge were drawn in an overlapped manner. In Figure 2 they are kept separately as the researcher claims that their degree of overlapping may vary depending on the synergy observed under the given context.

Van den Ban and Hawkins' Conceptualization of Extension

Another model, seemingly linear, is provided by Van den Ban and Hawkins (1988) as Figure 3 shows. The one way arrows indicate the direction of influence. As agricultural and socio-psychological research results reach the

extension organization, the extension agents (or development agents) transmit it to farmers in line with the existing governing agricultural policies on the assumption that farmers change their farms.

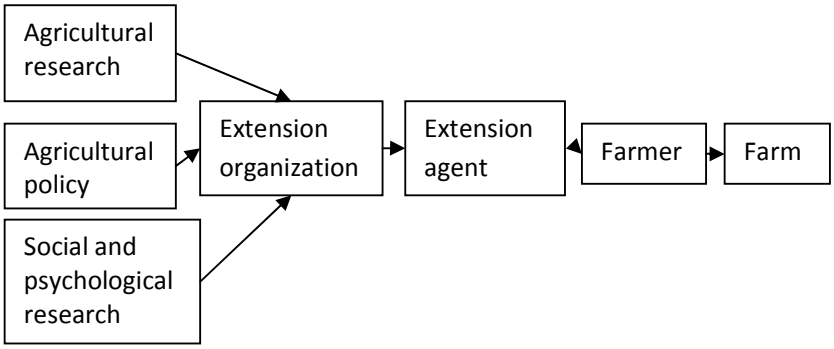


**Figure 3: Linear Model of Agricultural Extension**

Source: Van den Ban and Hawkins (1988, p.16)

The model refers to the typical transfer of technology paradigm that was advocated widely before the 1970s. In this case, farmers are mere recipients of knowledge and information. They have little role in the extension communication process as the model lacks a feedback loop. It does not also infer the importance of farmers' direct link to research so as to develop their capacity of experimentation. Effectiveness of extension is, hence, judged based on what knowledge and information is transferred regardless of what it does for the farmers in changing their situation.

## Deshler's Approach to Agricultural Extension

Deshler's (1997) approach in viewing the effectiveness of extension is interesting. Deshler in arguing the effectiveness of agricultural extension, first, puts the stakeholders in perspective. In the perspective of funding agencies, effectiveness is analyzed more in terms of utilizing allocated budget in an

accountable manner. Extension personnel see effectiveness from the point of view of programme improvement. Policy makers and programme administrators would like to assess the contribution of extension to new ways of thinking about extension. Farmers, on the other hand, assess effectiveness from the perspective of benefits accrued to them. Hence, effectiveness has different connotation depending on where the analyst is standing within the wider system of extension programme development and delivery processes. This view in assessing effectiveness is somehow consistent with the definition of agricultural extension given by LBL (2003).

## Adult Learning Theories

Adult learning theories are generally based on valuing and appreciating the heterogeneity and amorphous nature of the people involved in the learning process in different circumstances – age, status, problems and needs, exposure and experience, etc. The andragogical approach of Malcolm Shepherd Knowles, the experiential learning theory of David Kolb, the transformational theory of adult learning of Jack Mezirow, the Action Learning approach of Reginald Revans and the 'reflection-in-action' theory of Donald Schön are all developed in relation to concerns of diversity and complexity of adult learning. The basic tenets of these various theories have been summarized below.

*Malcolm Shepherd Knowles' andragogical approach of adult learning:* Knowles is known as a champion of andragogy. The basic essence of andragogy, as opposed to pedagogy, is facilitating a self-directed learning in people rather than a focus on mere teaching (Knowles, 1950; Smith, 2002).

The following five characteristics of adults were the main push for Knowles to become the father and advocator of andragogy as an alternative for adult learning.

i. *Self-concept*: as a person matures and becomes an adult his/her self concept moves from one of being a dependent personality toward one of being a self-directed human being.

ii. *Experience*: as a person matures he/she accumulates a growing reservoir of experience that becomes an increasing resource for learning.

iii. *Readiness to learn*: as a person matures his/her readiness to learn becomes oriented increasingly to the developmental tasks of his social roles.

iv. *Orientation to learning*: as a person matures his/her time perspective changes from one of postponed application of knowledge to immediacy of application, and accordingly his orientation toward learning shifts from one of subject-centeredness to one of problem centeredness.

v. *Motivation to learn*: as a person matures the motivation to learn is internal (Knowles, 1950; Knowles 1984, cited in Smith, 2002).

So in an andragogical approach, learning should be different from what we all know in pedagogy. In this case, learning can take place anywhere – on the job, in home, in school, in church, in mosque, in play groups and in any other places where people come together voluntarily. It is, thus, up to the facilitators to use those venues in a way they facilitate learning and help realize the objectives of andragogical learning in adults such as helping them

to acquire a mature understanding of themselves; develop an attitude of acceptance, love, and respect toward others; develop a dynamic attitude toward life; learn to react to the causes, not the symptoms, of behaviour; acquire the skills necessary to achieve the potentials of their personalities; understand the essential values in the capital of human experience; understand their society and should be skilful in directing social change (Knowles, 1950). In this connection, an agricultural extension service whose main clienteles are adults is evaluated from the point of view of how adults play their roles.

*The experiential learning theory of David Kolb*: according to the theory of Kolb (1984), experiential learning occurs when an individual experiences an activity by performing it; sharing the experience by describing what happened; processing the experience and identifying common themes; generalizing from experience to form principles and guidelines that are useful for life situations; and applying the outcome of the whole learning process to change an existing problematic situation into a desirable one. For simplified conceptualization, the theory is depicted as in Figure 4.

Farmers' Field Schools (FFS), often termed as "schools without walls" are implemented in many developing countries based on the theory of experiential learning (Davis & Place, as cited in Anandajayasekeram, Davis & Workneh, 2007). In FFS, farmer experimentation, group actions and interactions, discovery learning and eventual empowerment are the important characteristics. These are integral components of an experiential learning process. A practical and pioneering example on success of FFS, as an

experiential learning model, is the Integrated Pest Management (IPM) work in rice production in Indonesia (ESSDN, 1995).

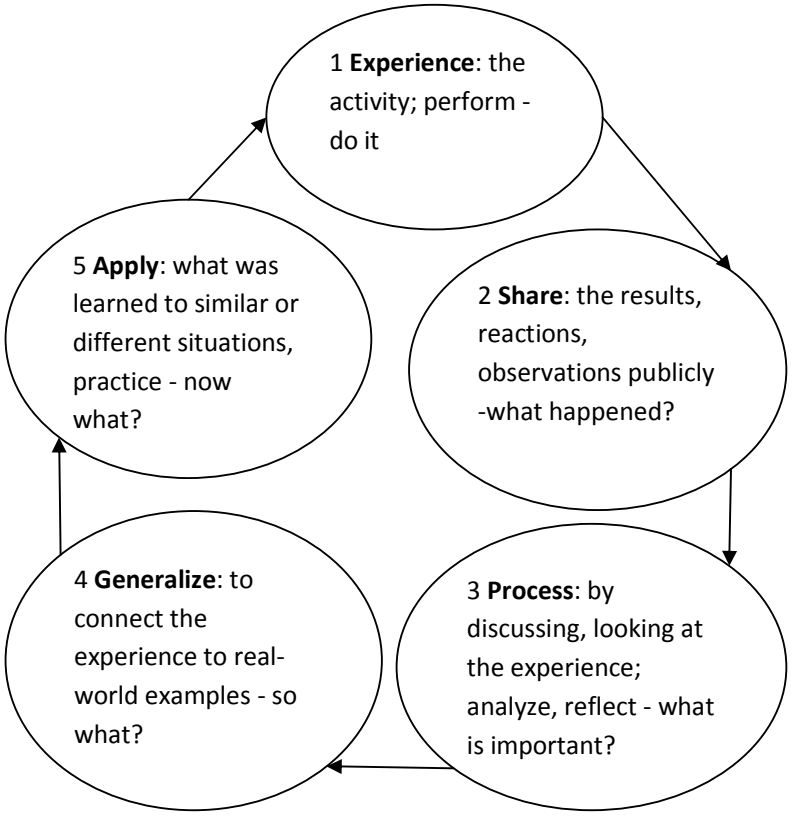


**Figure 4: Experiential Learning Cycle**

Source: Kolb (1984)

When one assesses effectiveness of extension from an experiential learning point of view, he/she can analyze: availability of opportunities for farmers to be engaged in a practically relevant farm activity to gain useful experience; existence of mechanisms such as meetings and other forums to share the experience among other farmers and important stakeholders; extent of scrutiny of important themes that deserve due attentions in the development process; whether farmers can generalize their experiences to form principles;

and extent of application of principles, guidelines and outcomes of the extension learning programmes.

*The transformational theory of Jack Mezirow's adult learning:* Transformational learning refers to learning that induces far-reaching change in the learner especially in learning experiences that shape the learner and produce a significant impact by positively influencing the learner's subsequent experiences (Clark, 1993, cited in Sunny, n.d.). For such a significant impact to be observed in the learners, transformational learning demands a as cited in Sunny, n.d.). From this point of view, effectiveness in extension can, thus, be assessed how the adult learning system is functioning as a whole.

*The action learning approach of Reginald Revans*: The concept of action learning was coined by Reginald Revans in the 1940's, and was first introduced in coal mines of Wales and England (Revans, 1969). But, later on, the concept was expanded and used in various areas of human encounter. Action learning is, in short, defined as learning by doing. More specifically, in action learning a group of people who have varied knowledge, skills and experiences are brought together to analyze a practically relevant problem, develop an action plan, implement the plan, monitor and evaluate implementation, draw necessary learning points, and make adjustments in the change process. In a typical action learning process, experiential learning, solving a problem creatively, acquiring relevant knowledge, and co-learning among the group members are essential activities (Revans, 1988, 1982).

The essence of action learning, in short, acknowledges that there can be no satisfactory external solution to one's own problematic situation. People involved in the process are, rather, in a best position to learn and solve the

problem they encountered by working together in an analytic way. So, an extension system's effectiveness can be assessed in line with facilitating action learning in the clienteles.

*The 'reflection-in-action' theory of Donald Alan Schön:* Donald Alan Schön has made significant contribution to the theory and practice of learning. Among the various forms of contributions, the notion 'reflection-in-action' is particularly important in relation to adult learning. In this approach of learning, reflection is brought into the centre of an understanding of what people do. Through reflection, good lessons will be reinforced and errors detected will be corrected to move on a further step in the change process (Argyris & Schön, 1978; Schön, 1983, both as cited in Smith, 2001). Reflection, as a feedback loop, will also help to develop mutual understanding between people involved in communicational transactions and reduce misunderstanding and distortion of information (O'Reilly, 1999). Effectiveness of an agricultural extension service can, therefore, be assessed based on its contribution to clients' extent of reflections on their activities.

## Agricultural Knowledge and Information System

The Agricultural Knowledge and Information System for Rural Development (AKIS/RD) model is another theoretical framework to analyze agricultural extension service as an integral component of a system of education-research-extension-farmer. This model which is also termed as the "knowledge triangle" was developed by professionals of FAO and the World Bank with an objective of linking people and institutions to promote mutual

learning and generate, share and utilize agriculture-related technologies, knowledge and information (Anandajayasekeram, *et al*., 2008; FAO & World Bank, 2000). The AKIS/RD framework integrates systematically the four stakeholders – farmers, educators, researchers and extensionists in the process of harnessing knowledge and information for mutual purposes (Figure 5). Farmers are put at the centre of the framework signifying that the other stakeholders are there to serve them through their various forms of assistance in enhancing farm productivity, increasing income, and improving welfare activities and helping them in managing natural resources for sustainable use (FAO & World Bank, 2000).

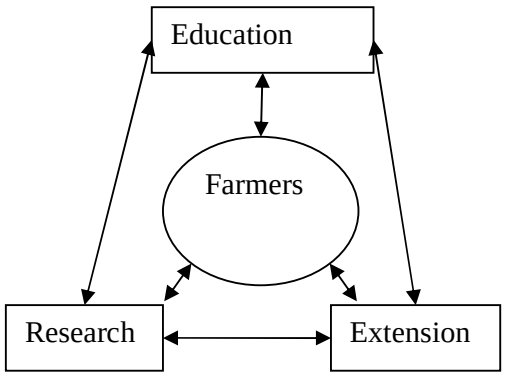


**Figure 5: The Agricultural Knowledge and Information System for Rural Development (AKIS/RD) Framework**

Source: FAO & World Bank (2000, p.2)

The AKIS/RD framework is modelled in line with the Land Grant universities of the United States where a single university has the triple roles – education, research and extension. In this case the management of the system is relatively simple compared to the situations in most of the developing countries where the responsibilities of education, research and extension lie in many cases in three different institutions or ministries. For example, in

Ethiopia, provision of formal education is the responsibility of the Ministry of Education; research is mainly the responsibility of the Ethiopian Research Organization where universities are just members of it; and provision of extension to farmers is the responsibility of the Ministry of Agriculture and Rural Development.

Bringing the three different institutions together to provide coherently useful service for the farmers is not as easy as the system in the United States and other countries such as for example, India, that provide all the three services under the same university. Therefore, the AKIS/RD model, though it is a good theoretical framework to understand the environment of extension, from practical point of view it is complicated and difficult to analyze effectiveness of extension in a pragmatic way as it sees changes and problems in a nutshell.

## The "Extension Butterfly"

The "extension butterfly" model (LBL, 2003, p.5) is another interesting framework that helps us understand and help in assessing effectiveness of extension (Figure 6).This model explains that depending on the interest of the analyst, agricultural extension could be narrowly understood by focussing only on the extension organization and its interaction with farmers. Accordingly, the functions can be divided into core functions that are directed to the clients and the organizational management functions. However, in practice, extension cannot be fully comprehended without a look at of its operational environment in addition to the core extension functions and organizational management functions. These may include research, input

supply, markets, policy premises, and other critically important elements for the proper functioning of the system.

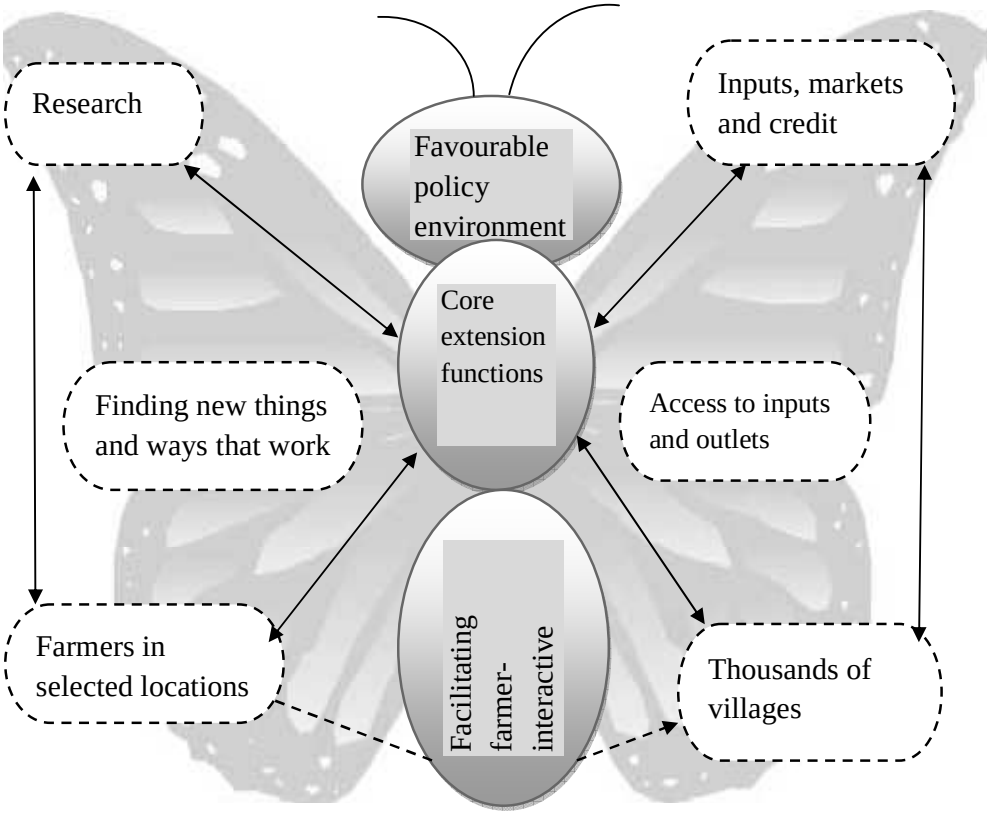


**Figure 6: The Extension Butterfly Model**

Source: LBL (2003)

The extension butterfly model is a conceptual framework that depicts the functions and roles of extension in a network of actors and contexts of rural development. This model can guide to analyze an existing extension system or to design a new setting through developing a common understanding or clarifying differences in extension approaches (LBL, 2003).

The main essence of the extension butterfly model is that the butterfly can fly if it has a head, thorax, abdomen and wings; by the same argument, an agricultural extension service can fulfil its expected social goal if all the functions work in a synergic manner – the core extension functions (thorax),

favourable policy environment (head), availability of new things (left wing), access to necessary resources (right wing), and disseminating new things (abdomen).

## Conceptual Framework of the Study

Agricultural extension is a system of non-formal education that aims at facilitating learning in people in relation to their own contexts and life situations so as they can identify their needs and problems; acquire knowledge and skills required to address the needs and problems; and inspire them to action (Boone, 1989). Extension education takes place in settings. The problems and needs of the clients provide the basis for the teaching and learning process.

The ultimate aim of an agricultural extension service is improving the standard of living of farmers through better decision-making processes and the adoption and adaptation of locally relevant technologies (Oladosu & Okunade, 2006). Such an ultimate aim can be realized through a synergic combination of several factors. In a synergic relationship people, organizations or things work together in order to achieve a result that is greater than the sum of their individual effects or capabilities (Microsoft® Encarta®, 2007). In this study the components that have to come together for the extension system to be effective are depicted by Figure 7.This conceptual framework is basically related to the extension butterfly model presented previously. However, for pragmatic reasons in measuring the impacts of each component both within the core extension activities and the supporting systems, the framework is presented in a detailed manner.

In the conceptual framework, solid and broken line arrows have been used to link the boxes. The solid arrows indicate links that lead to the box "Effectiveness of the Public Agricultural Extension Service" in addressing problems and needs of clients as seen by farmers and development agents. The broken arrows, on the other hand, indicate feedback loop on the effectiveness situation of the PAES.

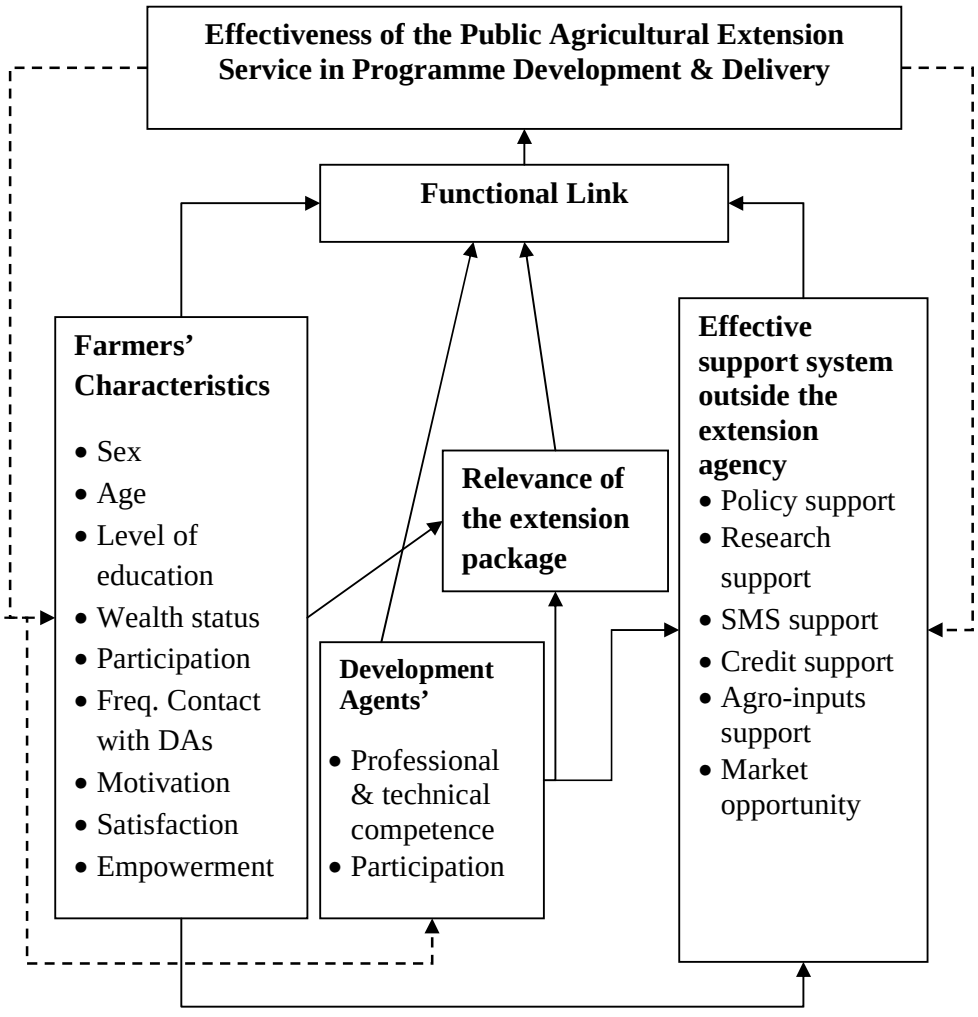


**Figure 7: Conceptual Framework of the Study**

Source: Researcher's Own Construct

The framework was developed with a strong conviction that desired change in clienteles and effectiveness in the PAES can come through combined effects of many things. These include (1) farmers' characteristics such as sex, age, level of education, wealth status, motivation and satisfaction with extension, level of empowerment, participation in extension and frequency of contact with development agents; (2) degree of relevance of extension packages; (3) development agents' professional and technical competencies, and their participation in extension; and (4) degree of other support systems outside the extension agency.

In the conceptual framework, the support system that is needed outside the extension agency include relevant policy directions, research, subject matter specialists, credit facility, agro-inputs, and market opportunities. For the public agricultural extension system to be effective, all these elements need to work properly and be linked in a synergic manner. Each of these elements has been discussed in relation to existing literatures.

## Farmers' Characteristics

Farmers' characteristics include both given ones (natural and irreversible) and those which can be improved through intervention. Sex and age are natural and irreversible attributes against which development practitioners do nothing to change them but search for something that suits those categories. On the other hand, level of education; wealth status; participation in extension; frequency of contact with a development agent; motivation; satisfaction; and empowerment are variables which can be

improved through different forms of extension interventions. For mutual understanding, the relationship of each of those characteristics with effectiveness of extension has been discussed below.

**Sex**

With regard to the relationship between sex and effectiveness of extension, Belloncle (1989) and Hegde (2005) by citing African and Asian experiences, respectively, ascertained that women are not benefiting from extension service as one may expect as half part of a society in consideration. So, with regard to equity to gender, extension is not effective. This view was also shared by Haug (1999) and Anandajayasekeram, *et al*. (2005, 2008). According to them, extension is not effective in terms of addressing the needs of diversified groups of farmers including gender issues. In practical sense, gender perspectives and gender differentiations are rather issues frequently taken as fashions.

In Ethiopia, (Percy, 2001) reported that women carry out 40 percent of the farm activities but they have little access to extension service. Katungi, *et al*. (2008) ascribed gender related differences in getting benefits from services like extension to differences principally in social capital which also influences social learning. In this view, generally men have better social capital which has a direct link with exchange of information and learning. Nwachukwu (2005), and FAO and World Bank (2000), on the other hand, found that women are disadvantaged in extension services because of limited access to resources, decision-making power, education and information, agricultural inputs and credits. Nwachukwu (2005) and Saito and Weidemann (1990) also

claimed that in different instances women farmers are expected to get extension message from "trickle across" information not from a properly channelled communication efforts. Commonwealth Secretariat (2001) generalizes that the fact women-farmers benefit less from development interventions is, rather, a reflection of gender-blind policies and programmes.

Having recognized women's marginalized status in information exchange, learning and benefiting in a men biased extension service, the Nigerian Women in Agriculture (WIA) project was, for instance, institutionalized in 1989 into the agricultural extension system; and WIA was evaluated as a successful intervention in making women beneficiaries of agricultural programmes, creating better access to farm inputs and credits, and developing countervailing power in women in matters of importance for the community (Nwachukwu, 2005; World Bank, 1996).

**Age**

Age and effectiveness in extension are related through the versatile nature of young people in their activities. Accordingly, provided the technological packages are relevant in terms of technical, social and economic considerations, young farmers can adopt fast and become beneficiaries of extension which in turn contributes to its effectiveness (Belloncle, 1989). Nwachukwu (2005), in contrary, reported that young farmers have low levels of access to resources which directly affect them from getting the expected benefit from agricultural extension service. Those two sides of arguments show us that the relationship between age and effectiveness of extension depends on the contextual issues prevailing in the areas of analysis.

**Level of Education**

With respect to education, different authors reported a direct relationship between farmers' level of education and relative success of an extension programme in meeting its social goal (Belloncle, 1989; Hegde, 2005; Weir & Knight, 2000). Belloncle (1989) specifically ascertains the important role of education for farmers in agricultural production, especially, in measuring areas of cultivation, and recording prices of factors of production and yield gained which are essential prerequisites for profitability analysis of farm enterprises and making informed decisions in the undertakings - thereby, having important contribution to the success of extension. To this effect, Belloncle (1989) suggests the importance of integrating literacy and numeracy programmes in agricultural extension services. FAO and World Bank (2000, p.10) further state the importance of education as:

> Education and training are no longer seen simply as processes of transferring knowledge or information, but rather as means to empower people to become critical thinkers and problem solvers who are better able to help themselves, but also better able to engage with others in order to learn, share information and address problems and priorities. This is very important for farmers whose ability to cope with the unpredictable is often the key to survival.

UNESCO also emphasizes the importance of education for adults in making development programmes effective, and further puts six important guiding principles of adult learning. These are: (1) adults need to know why they involve in an educational programme; (2) they need recognition of directing themselves as capable individuals; (3) they need their experience to

be valued; (4) they learn to cope with real life; (5) they need the learning process to be related to their practical needs; and (6) they value motivation in the learning process (UNESCO Institute for Education, 2005)

In an empirical study, Apantaku, Oloruntoba, and Fakoya (2003) found low educational status of farmers in a study made in Nigeria and as a result of which extension was not much effective.

**Wealth Status**

The relationship between wealth statuses of farmers and effectiveness of extension is probably the most widely studied. Different authors indicated that poor farmers are often marginalized and get the least benefit from extension service (Anandajayasekeram, *et al*. 2005; Berhanu, 2008; Farrington, 1994; Fleischer, *et al*., 2002; Haug, 1999; Hegde, 2005; Katungi, *et al*., 2008; Nwachukwu, 2005; Percy, 2001; Weir, *et al*., 2000; World Bank, 1996). These different sources indicate that every drop of benefit from extension goes to better of farmers at the expense of poor farmers. So, accordingly evaluation results of effectiveness of extension vary when data are disaggregated by wealth categories.

**Participation in Extension**

Farmers' participation in agricultural extension programme development and delivery process, and its relationship with effectiveness of extension has been widely documented. The general understanding is that participation in extension has a direct relationship with the benefits accrue through extension; the vice versa also holds true. Kemirembe, Brewer and

Krueger (2007) have found out, for instance, low participation of women in agricultural extension due to various reasons and for those groups of farmers effectiveness of extension was low.

In discussing about participation, the general agreement among development practitioners is that farmers are key stakeholders at grassroots level in an agricultural extension delivery system. Their functional participation in extension from needs assessment to evaluation of outcomes of implemented programmes is crucial from the point of view of facilitating learning, developing ownership, and bringing about long lasting and sustainable change both in the farm and the behaviour of farmers. In this connection the remark by Rivera and Alex (2004, p. xi) is in place: "The success of rural development program depends largely on decisions by rural people on such questions of what to grow, where to sell, how to maintain soil fertility, and how to manage common resources".

In its guideline on agricultural extension, the Ministry of Agriculture and Rural Development (MoARD) of Ethiopia (2006) stresses also the importance of participation in relation to owning extension programmes and breaking or unlearning some development hindering behaviours of farmers. In line with the same purpose, Alex, *et al*., (2004) put forward a comprehensive view point on the importance of, particularly, clients' participation in extension as follows:

> Participatory extension establishes mechanisms for clients to influence and share control over development initiatives and resource decisions that affect them. Participatory extension includes clients in extension decisions and may evolve into full control of activities by the clients.

> Thus, participation is both a means to distribute primary benefits more widely and one of the objectives by which development is measured (Alex, *et al*., 2004, p.13).

Several researchers have attested the value of farmers' participation in development works through empirical studies. The 'Environmentally and Socially Sustainable Development Network', ESSDN (1995) argued that farmers' participation in extension programmes put responsibility in their hands to determine types of services they require, makes the services more responsive to local conditions, more accountable, more effective and more sustainable. Leeuwis and Van den Ban (2004), on the other hand, see farmers' participation from the point of view of interactive model of communicative intervention where appropriate social goals are generated and designed with inputs from the ultimate beneficiaries rather than striving to persuade people to adopt pre-defined technological packages.

In Ethiopia, two success stories can be raised here regarding the importance of farmers' participation in technology development and evaluation. Mendesil, *et al*. (2007) in a study carried out to assess a participatory crop protection activity valued farmers' indigenous practices in controlling sorghum storage pests and understood the conditions under which pest infestation occurs. Shamebo and Belehu (1999) also reported successful selection and release of sweet potato varieties through a participatory variety development and evaluation processes in Southern Ethiopia. In India, Hegde (2005) indicated that outstanding plants were selected through the participation of farmers that lay the basis for the development of superior genotypes.

Van Asten, *et al.* (2004) also observed in Burkina Faso how farmers' knowledge was practically important in participatory problem identification. Farmers identified low productive spots by observing calcareous nature of the soil such as nodules and white efflorescence on the soil surface which were later verified as zinc deficiency with soil tests. Such an input from farmers, Van Asten, *et al.* (2004) pointed out, increased the understanding levels of development practitioners of the nature and origin of the low productive spots of soils to treat them with zinc fertilization.

ESSDN (1995) argues that involving farmers and getting mutual benefit by combining indigenous and modern research-based knowledge sources minimizes the risk of serious mistakes in development practices. In this line, the Integrated Pest Management (IPM) project in Indonesia that combines farmers' traditional crop management practices such as crop rotation and intercropping, and use of resistant varieties, biological pest control and diagnostic techniques is a good example of success (ESSDN, 1995). On IPM, another success story was reported in Ghana as a result of functional participation of farmers and extension staff in an IPM project. Among farmers who participated functionally in the IPM programme, improved working relationships, competencies in controlling pests and diseases, and enhanced capacity in sharing technical information were observed (Kwarteng, *et al*., 2004).

In short, successful technological development and meaningful change among clienteles requires input from the clienteles themselves as from the development practitioners (Leeuwis & Van den Ban, 2004). Therefore, participation of farmers as a process and result is essentially important in

agricultural and human development efforts. However, Richardson (2003), citing World Bank (1999), and Apantaku, Oloruntoba and Facoya (2003) expressed the inadequacy of the levels of participation of farmers in extension programme development and delivery. Gebremedhin, Hoekstra, and Tegegne (2006) have also assessed the Ethiopian extension system and characterized it as a top–down, non-participatory and primarily supply driven. In many cases, in development programmes such as extension (Richardson, 2003), farmers are mere passive receivers of didactic instructions; and programmes are implemented only based on professionals' perceptions of farmers' priority needs or desires of extension agencies without clear understanding of the real needs of farmers.

To facilitate farmers' participation, the extension approach has to change from an instructional, top-down manner to more participatory ways of facilitating communication and exchange of knowledge (Fleischer, *et al*, 2002); and for a functional involvement into the various stages of the extension, the educational programmes need to motivate farmers and enhance their empowerment. Unfortunately, in many cases, particularly in developing countries, extension services are provided without a due consideration of such important elements (Berhanu, 2008). In many cases, agricultural development implementers claim nominally that the programmes they run are participatory; but, in actual terms the approach is not well understood. As a result, a low participation level of farmers is often a bottleneck for developing relevant technological packages (Plüss, *et al*., 2008). Lahai, *et al*. (2000) have also found a direct relationship between farmers' frequency of contact with development agents and their levels of participation in extension. In that study,

it was also indicated that female farmers contacted by female development agents had higher level of participation and overall satisfaction with extension.

**Frequency of Contact with Development Agents**

Frequent contact of farmers with development agents helps them to internalize well the extension education they receive as issues can be clarified whenever the contact occurs. Contacts during the different agricultural seasons are particularly important. In those contact times farmers can learn about different things related to the types of the activities undertaken in each season as agriculture in the developing countries is mainly seasonal in its nature.

Different authors argue that farmers' frequency of contact with development agents has a direct relationship with effectiveness of extension - the more the frequency of contact of farmers and the development agents the better the effectiveness of the extension service (Aphunu & Otoikhian, 2008; Lahai, *et al.*, 2000; Sarker & Itohara, 2009). Lahai, *et al.* (2000) attributes the effectiveness of extension due to contacts to farmers' enhanced level of participation and overall satisfaction with extension. On the other hand, Oladosu (2006), paradoxically, reported an inverse relationship between frequency of contact and effectiveness of extension. However, all those authors reported, on the average, low frequencies of contacts.

**Motivation**

"A motive is something that prompts a person to act in a certain way"; in this line, the PAES need to motivate farmers "to adopt a progressive attitude toward change" (Maunder, 1972, p.113). Mattila, *et al.* (2007) also stress the

importance of motivating farmers as a critical success factor in extension. Motivation of farmers promotes application of knowledge gained through extension education into practice; and it can be brought by different mechanisms. Hegde (2005), for instance, ascertained that on-farm demonstration, visits to successful areas, and use of audio-visual techniques in facilitating learning enhance motivational levels in farmers. However, maintaining motivational levels in practice is often a problem. For example, in an empirical study, Apantaku, *et al.* (2003) found low motivation levels of farmers in extension in a study conducted in Nigeria.

**Satisfaction**

A number of sub-optimal conditions can compromise farmers' satisfactions in extension. Gebremedhin, Hoekstra, and Tegegne (2006), for instance, argue that lack of relevant and appropriate technologies to improve productivity affects farmers' satisfaction negatively.

**Empowerment**

The term empowerment has been defined by Chamala (1990) to mean 'enable, allow, and permit'; and as Chamala (1990) argues empowerment is viewed as both self and outsiders initiated phenomenon. Chamberlin (2008), on the other hand, defines empowerment in relation to enhanced access to information, critical thinking, assertiveness, and self-esteem.

Access to information is an essential component in the process of measuring the contribution of a given extension programme to empowerment. People who have better access to sufficient and relevant information can, in

general, make better decisions by weighing the possible consequences of various choices and courses of actions.

Critical thinking, on the other hand, refers to the ability of individuals to discriminate and relate issues of concern, and to forecast and predict the occurrence of events or phenomena. Assertiveness refers to the confidence level of individuals in stating their positions or claims and choosing what they want; and self-esteem is about the degree of positive self-image and hope to make a difference in life endeavours. A person who is hopeful believes in the possibility of future change and improvement; without hope, it seems pointless to make an effort. It is also important to note that empowerment is not a destination; it is rather a journey that no one reaches a final stage at which further improvement in the aspects considered is unnecessary (Chamberlin, 2008).

In agricultural extension service provisions empowering farmers need to be one of the multi-faceted objectives as empowered farmers can take charge of and drive agricultural productivity (ASARECA, 2009). Empowered clients can also facilitate reversal of learning among researchers, extensionists and themselves. The role of the DAs in such a process is, therefore, to help farmers take charge of their growth and development through appropriate facilitation. For instance, DAs can help farmers in building, developing, and enhancing their power through cooperation, sharing and working together for the benefit of economy of scale (Anandajayasekeram, *et al*., 2008).

As Anandajayasekeram, *et al*., (2008) argue empowered farmers will have also broader choices for decision-making. In this connection, participatory approaches that systematically combine scientific knowledge of

researchers and local knowledge and practical experiences of farmers and which foster a spirit of joint experimentation and exploration help to increase self-confidence in farmers and thereby have high empowering effect among farmers (LBL, 2003). To this effect, Gebremedhin, Hoekstra, and Tegegne (2006) argue on the necessity of a changing role in extension as knowledge broker and facilitator of farmers' empowerment. From such a concern, as Farrington (1994) rightly argued, the term 'extension' is misleading as it implies linear and unidirectional flow of information mainly from research agencies to farmers. If extension is understood with such conventional view, it is difficult to see its role in enhancing farmers' empowerment.

For farmers who have diverse needs to be empowered, as ESSDN (1995) argue, there has to be a fundamental shift in the approach of the PAES towards educating and enabling farmers to define and solve their own problems, and to determine and take responsibility in a demand driven extension service. In facilitating this process, it is implied that the organization that is supposed to be a supporter of farmers had to change and the development practitioners need to have a proactive outlook and ensure that opportunities are available for all the diverse groups of farmers including women and other resource poor members of the community.

Chamberlin (2008) noted that the concept "empowerment", in many cases, is used in a vague and wide array of meanings without clear contexts and operational definitions. According to her observation, for example, some people believe that cutting off available benefits from recipients will "empower" them presumably leading to a self-sufficient condition. However,

such a broad use of the concept leads to a danger of losing its inherent meaning and care need to be taken about.

Empirical studies on farmers' level of empowerment by extension are rare. But, the Neuchatèl group (2004) in general reported low levels of contribution of extension towards this variable.

Support System outside the Extension Agency

Cross sectoral linkages and support systems between agricultural extension and other relevant sectors are important in providing effective service to farming communities. Principally the important support systems to extension include relevant extension package, credit facility, agro-inputs and market opportunities for farm produces, policy, research, and subject matter specialists.

**Relevance of Extension Packages**

Relevance of extension packages basically refers to the technical feasibility, social acceptability, and economic profitability of technologies being promoted (Belloncle, 1989). A technological package that addresses farmers' perceived problems and needs is of the first concern in measuring rates of transfer and adoption of extension packages. A relevant technology diffuses spontaneously. On the other hand, a technological package that is not relevant will be resisted by farmers whatever a great deal of promotion is made. Moris (1989) argues, provided other things work properly, the quality of extension is only as good as the quality of the extension packages recommended to farmers.

A major difficulty facing extension service, particularly in Africa, is non-relevance of agricultural technologies being made available to farmers (Baxter, 1989; Belloncle, 1989; Haug, 1999); and, often, farmers are being held responsible and blamed for non-adoption without assessing the relevance of the technological package under consideration.

In many cases, extension packages are not relevant because they are developed without considering farmers' priority needs and problems – as a result they are often too simple to solve complex problems of farmers (Apantaku, Oloruntoba, & Fakoya, 2003; Haug, 1999; Oladosu, 2006). For instance, in Lesotho, Mokone and Steyn (2005) have found out that farming communities were not provided with appropriate technologies derived from research. As a result the extension endeavours were assessed to be less effective for the intended beneficiaries. Johnson (2003) also observed a similar thing in Nigeria. According his observation, research undertakings were designed for technologies that were out of reach of most Nigerian farmers.

As a general remark, Berhanu (2008) posits that an extension provision system that discriminates its service according to the contextual issues of target groups enhances its relevance and discharges its responsibilities effectively; in turn, it increases the level of satisfaction of clienteles through meeting expected social goals. In this aspect, the goat project of Hawassa University that clearly stratifies extension users and carryout activities accordingly is a good example to cite.

In effect, extension packages have to be adapted to different agro-ecological and socio-economic conditions, and the farmers' knowledge base. A blanket approach that sees change as a top down process is outmoded

(Farrington, 1994). Leeuwis and Van den Ban (2004) and Qamar (2005) also share this view. They argue on the importance of developing location-specific, participatory, gender-sensitive and inexpensive extension packages instead of trying to graft those packages that are promoted in somewhere else with a different context.

**Credit Support**

Many of smallholding farmers in developing countries manage a farm household system with multiple objectives and multiple enterprises with limited resources (Anandajayasekeram, *et al*., 2008). So, in extension availability of credit is, as reported by Baryeh, Ntifo-Siaw, and Baryeh (2000), an important factor in the success of technology adoption and utilization. Credit is, in fact, as LBL (2003) argues, a special kind of means of production. However, as LBL (2003), Oladosu (2006), citing Francis, *et al*., (1987), and Plucknett, (2004) posit, access to and adequacy of credit is often a main constraint in agricultural production.

**Agro-Inputs Support**

In developing countries, majority of the farmers undertake farming under rain-fed condition, and all other agricultural activities are carried out in critically inflexible seasons. So farm inputs must be available on time with reasonable prices for farmers to make good use of the respective seasons. Baryeh, *et al*. (2000) are also to the opinion that success in agriculture through the adoption of new technologies is largely possible through the acquisition of inputs with reasonable prices.

**Market Opportunity**

An article of nearly five scores of years discusses the importance of market availability for agricultural products as an impetus for production itself (Boyle, 1921). The necessity of market availability is even higher, as Rivera and Alex (2004) argue, in the present day competitive agriculture and market-oriented climate. Bagamba (2007) has shown specifically how availability of market for banana has encouraged the producers. Helping farmers to get market for their agricultural products and increasing their ability to compete in the market is, therefore, one of the crucial tasks of an agricultural extension service system (Van den Ban, 2002).

**Policy Support**

Agricultural extension activities are executed under the wider policy environment of a country. So it is a must for an extension department or agency to lay down its development goals and strategies in line with the prevailing policy directives of a country or relevant ministries. In this aspect extension, as an entity, is highly affected (positively or negatively) with an existing policy or non-existence of policy in some regards. Haug (1999) argues the importance of having a general agricultural policy and extension policy as essential components in effectiveness of extension. However, according to her experience policy issues are often neglected in extension endeavours and as a result of which extension efforts are less effective. ODI (2002) further claims the importance of pro-poor agricultural extension policy as it understands the differential impacts of generic extension approaches and packages.

**Research Support**

Effectiveness of extension is to a large extent associated with a functional link with research (Borlaug, 2004). The agricultural sector is in a dynamic state; there always takes change either because of the occurrence of problems or availability of good opportunities. So, the extension system needs to be supported with research findings that better address proactively clients' problems and needs under those changing circumstances. It is a well known fact that without a functional linkage, research cannot scale up innovations that benefit rural people and extension cannot offer services that address the problems of farmers (Plüss, *et al*., 2008).

Unfortunately, in many developing countries, including Ethiopia, research and extension are not well integrated basically because of structural problems. Unlike the triad structural arrangements of the United States, and other similar countries in which research and extension are the mandates of universities besides teaching, in developing countries the two sub-agencies function differently. As a result of this, research problems are not often related with problems and needs of farmers. Rivera and Alex (2004) also ascertain the importance of continuous flow of appropriate innovations for proper functioning of an extension system. However, according to their studies, knowledge creation and access are so weak in most of the developing countries.

Apantaku *et al.* (2003) and Plüss, *et al*. (2008) in studies conducted in Nigeria and East Asia, respectively, have also found out low collaboration levels between research and extension agencies. Haug (1999), citing Chinene et al. (1997), has also indicated a missing link between research and extension

in Zambia. The problem of low research support to extension is, in fact, perennial in its nature; another author has also reported it about a score of years ago (Moris, 1989).

Low level linkage between research and extension is often attributed to reward systems that are in place (Agbamu, 2000). Researchers get different forms of rewards including promotion of rank and monetary payments based on publications not by changes observed in the life situations of farmers. So, they often see working with extensionists and being exposed to harsh situations of rural areas that bring little or no incentive to them as punitive adventures.

**Subject Matter Specialists (SMSs) Support**

SMSs play important roles in research-extension-farmers linkage. Linkage, as Agbamu (2000) defined refers to communication and working relationships established between any two or more agencies that pursue a commonly shared objective. In this case, research and extension subsystems pursue for the same ultimate objective of improving agricultural production both quantitatively and qualitatively so as to help people lead a better standard of living. For such an objective to be realized, there need to be a functional linkage between the research and extension subsystems. In turn, functional linkage between the two subsystems is practically possible through qualified subject matter specialists (Johnson, 2003) who liaison the two subsystems.

Broadly speaking, SMSs can be classified into two according to the roles they play in extension. These are SMSs who should work with researchers to develop extension guidelines and recommendations, and those

who should develop extension communication materials (for instance, leaflets, posters, slide shows, etc.) that are relevant to get across the extension recommendations to farmers by development agents. For proper functioning of an extension system, both roles of the SMSs need to be fulfilled. If a functional linkage is established, research will be conducted based on farmers' problems and the result will also fit with technological requirements, socio-economic and ecological concerns of farmers – there by contributing to effectiveness of an extension system. Agbamu (2000) conceptualizes the research-extension linkage and the relative position of SMSs diagrammatically as Figure 8 shows.

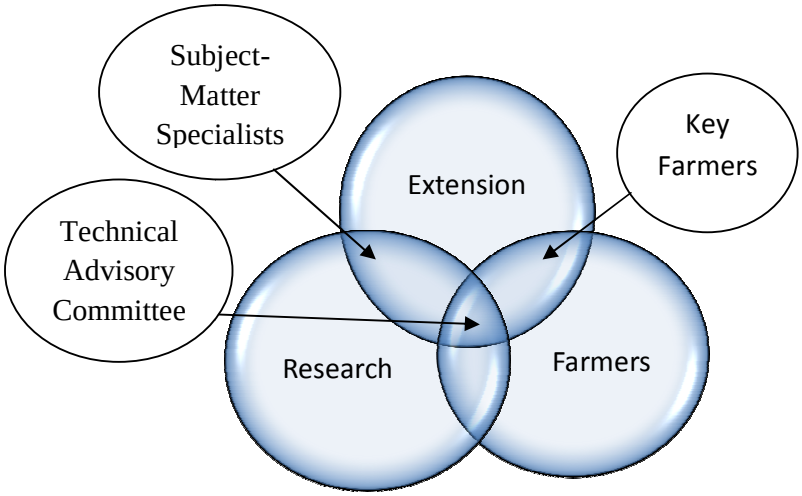


**Figure 8: Research-Extension Linkage and Relative Position of SMSs**

Source: Agbamu (2000)

Agbamu (2000) further states that to fine tune the works of SMSs appropriate supports can be sought from a 'Technical Advisory Committee' and some selected 'Key Farmers'. The committee can be formed with individuals from research and extension agencies, and farmers.

SMS support levels and proper liaison between research and extension are, however, often weak owing to problems of budgeting, lack of properly trained manpower and low commitment levels to the job (Jonson, 2003; Oladosu, 2006).

Professional and Technical Competence of Development Agents

FAO (1985, p.91) gives a succinct explanation on the importance of professional and technical competence of extension workers, development agents in the present context:

> The whole extension process is dependent upon the extension agent, who is the critical element in all extension activities. If the extension agent is not able to respond to a given situation and function effectively, it does not matter how imaginative the extension approach is or how impressive the supply of inputs and resources for extension work. Indeed, the effectiveness of the extension agent can often determine the success or failure of an extension programme.

In the Ethiopian case, 'development agent' is a commonly used term to extension agent; so for a purpose of country-relevance, this phrase is used consistently in this study. Development agents bridge the extension organization and the farmers and they have a wide range of responsibilities and roles. Havelock (1973), cited in Khalil, *et al*. (2008), identified four roles of development agents in assisting farmers - catalyst, solution giver, process helper, and resource linker. FAO (1985), on the other hand, listed six roles of a development agent – arousing people to recognize and take an interest in their problems; achieving transformation of attitudes, behaviours, and social

organizations; linking government and people; setting in motion; helping people form their own organizations; an activist; and a professional who influences the innovation and decision making processes in a desirable direction. Though the ways of presentation vary, both Havelock (1973) and FAO (1985) agree on the general roles of a development agent, who is in short, accountable to both the farmers and the policy premises of the extension organization.

In gauging the performance of development agents, professional and technical competencies are critically important components. Competency of a development agent is an underlying characteristic or behaviour that the agent needs to demonstrate. It could be motive, trait, and skill, aspect of self image or social role, or body of knowledge which one uses (Boyatzis, 1982, cited in Khalil, *et al*., 2008). Somehow a similar understanding was also reflected by Spencer and Spencer (1993) who define competence as an underling characteristic of an individual that is causally related to a criterion-referenced effectiveness or superiority in performance.

To condense the main essence in relation to a development agent, competency is the capability that the agent brings to the job situation as required by the tasks. This, in general, refers to knowledge and skills of the development agent in human development; leadership; communication; participatory extension programme development, delivery, monitoring and evaluation.

To assist farmers effectively, development agents need to have sound professional and technical competencies. A recent study made in the Republic of Yemen combined professional and technical competencies and named as

"leadership competencies" (Khalil, *et al.* 2008, p.1). In the present study, for a purpose of clarity, the two components of competency are maintained separately.

Navaratnam (1985) and FAO and World Bank (2000) ascertain that formal training curricula for development agents in agricultural universities and colleges miss contents in professional competences which are mainly addressed by social science disciplines. This finding was also supported with a recent study by Khan, Nawab, and Khan (2006) who reported a high technical competence of development agents in weed management but low professional competence in working with farmers.

The work of development agents demands a systematic integration of both the professional and technical competencies. Thus, a technically competent agent cannot be effective in assisting farmers unless the technical competency is supported with professional competency. As Okorley, *et al*. (2002), citing Hurtling (1974) indicated professional competencies of development agents need to be developed through training and practical exposures while they are in their jobs.

Competency of development agents influence learning in farmers directly. To facilitate learning in farmers effectively, development agents need to have good working knowledge both in the natural and social sciences. Adequate skills and the right attitude for the profession are important as "facilitating learning processes involves more than simply disseminating new technologies" (Baltissen *et al.*, 2000, p. i).

Development agents should also be dynamic and adaptive to changing circumstances of their working environment. As Blackburn (1989, p.vii)

rightly said “effective programming decisions are not curved in stone”; extension programming and approach must change according to the site specific socioeconomic and agronomic conditions, rather than delivering pre-packaged messages. Development agents need also use participatory extension methods to work with farmers effectively (ESSDN, 1995).

In facilitating learning and inducing change in farmers, Leeuwis and Van den Ban (2004) argued, communication is a vital element of the strategies of a development agent. In this connection, Blackburn (1989) also stressed the importance of a convergence model of communication to a linear model that merely disseminates information. In a convergence model of communication, development agents translate and simplify the information for farmers besides disseminating. In doing so, they need to relate the process with the existing indigenous knowledge and value systems of the farmers as “nothing operates within a vacuum” (Blackburn, 1989, p. vii).

Development agents need also understand the distinguishing characteristics of extension from other forms of adult education. Boone (1989, p.2) provides eight distinguishing characteristics of extension.

i. Extension education is concerned with helping people solve their immediate and long-term needs and problems. The educational process emphasises on enhancing knowledge, skills and values that are relevant to aid people in successfully coping with the changing circumstances of the micro-and macro environment.

ii. Extension education primarily emphasises learning that is valued in the context of the learner’s life situations. The

outcomes of the learning process bring self-awareness, productivity, material well-being and ability to control the environment.

iii. Extension education emphasises the involvement of learners in the decision-making process.

iv. Extension educational programmes are planned and sequenced to bring about desirable behavioural changes in the learners; and the programme activities focus on the felt needs of the clienteles.

v. Extension programmes are closely related to the contextual situation of the learner.

vi. Extension programmes are conducted close to where the learners live and work, such as the home, farm and other workplaces or community centres so as to economize on resources.

vii. In extension educational process, varieties of resources and technologies are used, and emphasise is on learning rather than teaching.

viii. Clients of extension participate in the programme on voluntary basis and they can also drop out if they don't want to continue participating.

In line with the aforementioned characteristics of extension, Aphunu and Otoikhian (2008) put DAs' competence as one important dimension in the success of extension. Having a clear understanding of those distinguishing characteristics of extension helps the development agents to analyse what kind

of knowledge is required, how the knowledge is used, and how adult teaching and learning can best be carried out. However, in many developing countries the efficiency of development agents is so low owing to low levels of education, low commitment, and lack of adequate reward systems (Karbasioun, *et al*, 2007a). In Ethiopia, Gebremedhin, Hoekstra, and Tegegne (2006) have also reported a low capacity and morale of development agents as a bottleneck in the agricultural transformation process. Leeuwis and Van den Ban (2004) underlined the importance of credibility and trustworthiness of intervening agents both in professional and technical competencies in facilitating change in behaviour among farmers. A development agent who has good professional and technical competencies will interact and communicate properly with farmers and increase farmers' performance in extension.

## Development Agents' Participation in Extension

It was indicated earlier that development agents are important bridges between the extension organization and the farmers. Röling (1988) puts DAs as one of the essential components in providing extension service to clienteles. Therefore, DAs' participation in the different stages of extension has great values in relation to making the service more effective and need-based. However, their rate of participation in extension is often low. Sadighi and Mohammadzadeh (2002) have found out, for instance, low level of development agents' participation in their study undertaken in Iran.

# CHAPTER THREE

# METHODOLOGY

## Introduction

In this chapter, where and how the study was conducted are presented. More specifically, the chapter includes the research design; population and sampling; research instruments; data collection procedure; and data analyses and interpretations.

## Research Design

The research was a quantitative cross-sectional survey with a correlation design. Survey is a most common descriptive method that is conducted to achieve any of the following three purposes: (i) describing the nature of existing conditions, (ii) identifying standards against which existing conditions can be compared, and (iii) determining the relationships that exist between specific events (Cohen & Manion, 1980). From those purposes, one can understand that the level of complexity of surveys may vary from those which provide some frequency counts to those which present relational analyses. The purposes of the present survey were related to (i) and (iii).

As Bennett (1976) points out, survey is an important research method to collect data on perceptions or opinions about activities and outcomes of extension programmes; with relatively less cost a survey can quickly shed

light in line with specific objectives and research questions of a study. Such an aspect of a survey is particularly important for a thesis work which has a short life span. A cross-sectional survey, however, unlike longitudinal and cohort-sequencing studies, does not show trends of developmental changes in characteristics or themes of investigation.

## Variables of the Study and their Measurements

In the study, farmers and development agents' perceived effectiveness of the PAES was the dependent variable. On the other hand, farmers' given and extension-induced characteristics; DAs' professional and technical competences; DAs' participation in extension; and levels of support systems to the PAES were the independent variables. Both the dependent and most of the independent variables were measured on a Likert type scale (Likert, 1932).

## Study Population

Farmers and DAs were the subjects of this study. The study was conducted in Soddo-zuria *Woreda* of Wolaita Zone, Ethiopia (Figure 1). As indicated under Chapter One, the *Woreda* is characterized by three sub-agro-ecologies; namely, cold, mildly cool/warm and hot climatic areas. These areas are traditionally referred to *Dega*, *Woinadega* and *Kolla*, respectively. The *Woreda* is further divided into 31 *Kebeles* (lowest administrative unit next to a district). The total household size of the *Woreda* is 27,768. Out of this figure, 24,527 and 3,241 households are male-headed and female-headed, respectively. In the Woreda, 93 diploma holder DAs have been assigned to work (Soddo-zuria *Woreda*, 2001).

## Sampling Procedure

Sample farmers were selected with a multi-stage selection process. To sample representative *Kebeles*, the *Woreda* was divided into the three agro-ecologies. In each of the agro-ecological clusters, three *Kebeles* were selected through a simple random lottery method. *Kebeles* such as Kokate-Marachere, Delbo-Wogene, and Gurumu-Wyde represent the cool climatic area and they were aggregated as *Loc1* (for Location). Three other Kebeles comprising Kuto-Serpela, Waja-Kero, and Bossa-Kacha represent the mildly cool climatic area and they were aggregated as *Loc2*. The other three *Kebeles* comprising Buge-Wanche, Humbo-Larena, and Tome-Gerera represent the hot climatic area in the *Woreda* and they were aggregated as *Loc3*.

In the three aggregated locations, altogether nine *Kebeles* were selected. In each of these nine *Kebele* offices, lists of all farmers who had been participating in the PAES, stratified by sex and wealth status, were obtained to be used as sampling frames. Accordingly, based on sex and wealth status, a stratified and systematic sampling technique was used. In each *Kebele* 75, male and female headed households were selected. A household in Ethiopian case is understood in a similar manner as FAO (2005, p.4) states; household is "an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form or size." Accordingly, the total number of households included for the survey in the *Woreda* was 225 out of which 177 and 48 were male and female respectively (Table 1).

**Table 1: Distribution of Sample Farmers by Sex in the three Grouped Kebeles**

| Grouped *Kebeles* | Number and percentage of farmers by sex | | Total |
|---|---|---|---|
| | Male | Female | |
| *Loc1* | 59 (33.3)[x] | 16 (33.3) | 75 |
| *Loc2* | 62 (35.1) | 13 (27.1) | 75 |
| *Loc3* | 56 (31.6) | 19 (39.6) | 75 |
| **Total** | **177 (100)** | **48 (100)** | **225** |

Note: '[x]' indicates percentages
Source: Survey Data (2009)

At a glance, the sampled number of female farmers seems small. It is because of the small size of female headed households in the *Woreda*. In the *Woreda*, female headed households are only about 11.7 percent. From this point of view, quite adequate numbers of female farmers (48 or 21.3%) have been included in the sample. A bit higher number of female farmers than their actual proportion in the population was included because some statistical tools require reasonably higher number of cases to carry out valid analyses. The proportion of the female-headed households in the study area was in contrary to what Adesiji, Akinsorata and Omokore (2010), and Aphunu and Otoikhian (2008) reported in their studies conducted in Nigeria.

According to Healey (2002), a sample of 100 is adequate enough to assume normal sampling distribution of means with mean equal to population mean (μ) and with standard deviation or standard error of the mean equal to population standard deviation divided by the square root of the sample size

($\partial/\sqrt{N}$ ). Therefore, a total sample size of 225 was pretty adequate for the purpose of the study.

Regarding to DAs, all of them who work in the *Woreda* were included in the study. With a few DAs being inaccessible, the number came out to be 85 out of the expected 93. This task was made possible through the facilitation roles of the staff of the *Woreda* Bureau of Agriculture and Rural Development.

## Instrumentation

The instruments and techniques used to collect data were questionnaires, focused group discussion, document analysis and observations. The main instrument was, however, a questionnaire. Two sets of questionnaires, one for farmers and the other for DAs, were designed. The questionnaires consisted of both close- and open-ended quantitative and qualitative items of inquiry. The quantitative items were based on mainly with artificially constructed continuum or Likert type scales.

For systematic administration the questionnaires were designed in parts. The parts, types and numbers of questions in the different parts of the questionnaires were determined in accordance with the research objectives set for the study. Accordingly, the questionnaire for farmers had six parts that were systematically arranged to elicit information on i) farmers' general demographic characteristics, ii) farmers' areas of farm and non-farm engagements, iii) extension-induced characteristics of farmers that include frequency of contact with DAs, and motivation, satisfaction and, empowerment through the PAES, and participation in the PAES, iv) DAs'

professional and technical competencies, v) support systems to the PAES that include relevance, timely availability and adequacy of extension packages, credit facility, and availability of markets for agricultural products, and vi) effectiveness of the PAES. On the other hand, the questionnaire for DAs had five parts that were designed to elicit information on i) DAs' general background that include sex, age, and education level and field of studies, ii) DAs' and farmers' level of participation (as perceived by DAs) in the PAES, iii) DAs' professional and technical competencies iv) support systems to the PAES that include relevance, timely availability and adequacy of extension packages, credit facility, availability of markets for agricultural products, and policy, research, and SMS supports to the PAES, v) effectiveness of the PAES. In designing the questions in the two sets of the questionnaires, due care was taken to include as much as several items for the research variables.

To enrich the responses from the questionnaires, focus group discussion with farmers, key-informant interviewing, observations and analysis of documents were also made. Those later techniques enabled the researcher to mainly answer *why* questions that eventually gave in-depth understanding of the theme of investigation.

Focus group interviewing is a technique by which a researcher elicits data more of a qualitative nature from a group of people who possess certain characteristics through a focused discussion (Krueger, 1994 but see McCaslin & Tibezinda, 1997). In this research work, men farmers and women farmers groups were formed to understand gender related issues in depth. Key-informants and observation, as methods of data collection were mainly used in gathering background information for the study and during facilitating focus

group discussions. Documents that were analyzed were different ones that have practical importance in relation to the theme of the study. Use of those multiple sources and ways of data collection techniques helped the researcher to triangulate the result and guaranteed the validity and quality of the work through cross-checking.

For face validity of the questionnaires, the researcher made all the necessary precautions. For content validity the supervisors of the research work made an assessment of the instruments. At that stage the English version of the questionnaires were translated into Amharic, the Official language in Ethiopia, and a panel of three experts drawn from Hawassa University, Southern Agricultural Research Institute, and Bureau of Agriculture and Rural Development of SNNPRS evaluated the Amharic version of the questionnaires for local relevance and properness of wording. The Amharic and English versions of the questionnaires have been included at the end of this thesis as Appendices B and C, respectively.

The evaluated Amharic version questionnaires were field-tested by taking 30 farmers and 30 DAs in Damot-wyde, a neighbouring *Woreda* where it was believed that both groups of respondents exhibit more or less similar characteristics to those included in the study. Accordingly, minor adjustments were made on both sets of the questionnaires to enhance their validity and reliability. For items measured on Likert type scales, Cronbach's alpha coefficients were calculated. Cronbanch's alpha measures how well a set of items (or variables) are internally consistent or reliable. In a statistical term, it is a measure of squared correlation between observed scores and true scores.

The theory behind Cronbach's alpha is that the observed score is equal to the true score plus the measurement error (Cronbach, 1951; Yu, n.d.).

## Data Collection

In a survey, be it small-scale or large-scale, data can be collected by a structured or semi-structured interviews, self-completion or postal questionnaires, standardized tests of performance, and attitude scales (Cohen & Manion, 1980). In this study, structured interview schedules and self-completion of questionnaires were the main data collection techniques. To assist the researcher in data collection, nine enumerators and three supervisors were recruited and trained for two days.

Data were collected from August to December 2009 in three phases. In the first phase, general information was gathered by visiting areas of the study. In the second phase, interview schedules and self-completed questionnaires were administered. Data on farmers were collected through interview schedules as the majority of the farmers were expected to be illiterate; whereas data on DAs were collected through self-administered questionnaires. A total of 225 questionnaires on farmers' responses and 85 on DAs' responses were collected. In the third phase, focus group discussions and key-informants interview took place. In all the data collection period, the researcher, the enumerators and the supervisors tried to make good rapport with the respondents to get as much as possible valid information. Observations and document analysis were done throughout all phases of data collection time.

## Data analysis and Interpretation

The data were analyzed using a Statistical Package for the Social Sciences which is also alternatively known as Software Package for Statistics and Simulation (SPSS) Version 15. For objectives one to six, univariate analyses such as frequencies, means, ranges and standard deviations were computed. As Gupta (1999) points out, univariate analysis is important to see attributes of each variable in terms of its distribution, central tendency, dispersion and presence of extreme values which are also referred to outliers in the language of statistics. To address objectives seven and eight, Pearson Product Moment (r) and its derivatives, Chi-square, t-test, and ANOVA were conducted as bivariate analyses. Multivariate analyses were carried out to check true relationships (multicollinearity testing) through partial-correlation analysis, and in regressing variables to determine best predictors of the dependent variable (objective 9).

In testing hypotheses, a 0.05 alpha level was set *a priori*. An alpha level of 0.05 is fixed because in social science studies an alpha level of 0.01 or lower is, as Howell (2002) argues, too stringent and conservative with respect to the probability of rejecting the null hypotheses. For analyses that showed significant variation in ANOVA, *a posteriori* analysis of Post Hoc multiple comparisons were made and among which means those differences occurred were exactly located.

In relation to objective nine, to assess the contribution of each predictor towards the variance in the dependent variable, the independent variables that showed significant correlations with effectiveness of the PAES were regressed using a multiple regression analysis technique. The multiple

regression model used was: $Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_n X_n + e$. Where $Y_i$ is the value of the dependent variable, in this case perceived effectiveness of the PAES; $\alpha$ is a constant or the $Y$ intercept; $X_1$ to $X_n$ are the independent variables used to estimate the dependent variable; $\beta_1$ to $\beta_n$ are partial slopes or coefficients of the independent variables, each explaining the amount of change in the dependent variable for a unit of change in an independent variable while controlling for the effects of other independent variables in the equation. As Healey (2002) ascertains, the partial slopes, or coefficients of the explanatory variables, are the same as partial correlation coefficients and they indicate direct effect of the associated independent variables on the dependent variable. The $e$ indicates the error or residue due to a combination of factors. This value, in short, is the difference between the actual value of the dependent variable, in the case of the present study, effectiveness of the PAES, and the value obtained through prediction.

In this study, in order to compare the relative effects of the various independent variables directly, standardized coefficients were used.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## Introduction

This chapter presents results and discussions of the research work. First, general background information is given on the two groups of respondents - farmers and development agents. This is followed by results vis-à-vis the objectives and hypotheses formulated for the study. In order to discern similarities and differences in perceptions of male and female farmers (gender disparities) wherever it was necessary, an attempt has been made to disaggregate the findings based on sex.

## General Characteristics of Farmers

In this section, general background information is given on the respondent farmers. The important components include age composition, educational background, wealth status, land holding, farming experience, off-farm activities, house type by sex and wealth status, types of agricultural enterprises, and years of participation in extension. These have been presented in subsequent sections in the order they are introduced here.

Age Composition by Sex

In some studies, age is considered as an important variable of diversity of farmers in extension provisions (Iwuchukwu, *et al*., 2008). Depending on the contextual situation, age is reported to have its own impact on effectiveness of extension. In line with this curiosity, the age composition of the respondent farmers was analysed and given in Table 2.

**Table 2: Age Composition of Respondent Farmers by Sex**

| **Age Category (years)** | **Male** | | **Female** | |
|---|---|---|---|---|
| | **Frequency** | **Percent*** | **Frequency** | **Percent*** |
| 20 to 39 | 74 | 41.8 | 22 | 45.8 |
| 40 to 59 | 92 | 52.0 | 26 | 54.2 |
| 60 and above | 11 | 6.0 | 0 | 0 |
| Total | 177 | 100 | 48 | 100 |

Mean age = 42; Mean (male = 42.31; female = 40.77); SD = 9.4; SD (male = 9.8; female = 7.4)
* Computed out of the respective sex totals
Source: Survey Data (2009)

Mean age of the respondent farmers was 42 years. Female farmers were distributed only in the first two age categories. Seemingly, the female farmers included in the sample were relatively younger than male farmers. However, an independent t-test showed that the difference between the mean ages of the male and female farmers was not statistically significant, $p > 0.05$, (Table 35, Appendix A). The overall age distribution of the respondent farmers was somehow similar to what Aphunu and Otoikhian (2008) reported in a study conducted in Nigeria.

Another independent t-test was also conducted using the mean age of 42 years as cut-point to see if there was a difference in perception of effectiveness of the PAES between relatively younger and older farmers. However, the test did not show statistically significant difference, $p > 0.05$ (Table 30). This finding contradicts Belloncle (1989) and Hedge (2005) implying that age was not important variable to see variations in responses on effectiveness of the PAES.

## Educational Background

Educational status of the respondent farmers is given by Table 3. The majority of the farmers are educated (149 or 66%), as opposed to what Berhanu (2008) reported in a study conducted in districts of North-Central part of Ethiopia. Quite similar proportions of educational statuses were, however, reported in studies conducted in Nigeria (Adesiji, Akinsorata & Omokore, 2010; Aphunu & Otoikhian, 2008).

In the present study, as the significance level of the Chi-square ($\chi^2$) test for independence shows ($p < 0.05$), female farmers are less educated than male farmers. The Chi-square test for independence was carried out by collapsing the five educational levels into only two categories of illiterate and literate groups owing to an interest to see differences between the literate and illiterate groups of farmers.

As Aphunu and Otoikhian (2008) argue, being literate is necessary in effective extension communication. Several authors, too, ascertain that educational status of farmers and making effective use of extension services are directly related. The better the educational status, the better they wisely

utilize extension services (Belloncle, 1989; FAO & World Bank, 2000; Hegde, 2005; UNESCO, 2005; Weir & Knight, 2000).

**Table 3: Educational Status of Respondent Farmers by Sex, and Chi-Square Test for Independence**

| Educational Levels | | Sex | | Total | $\chi^2$ | Sig |
|---|---|---|---|---|---|---|
| | | Male | Female | | | |
| **Illiterate (76)** | Unable to read and write | 45 | 31 | 76 | 24.17 | 0.000* |
| **Literate (149)** | Able to read and write only | 5 | 2 | 7 | | |
| | Grade 1-4 | 31 | 4 | 35 | | |
| | Grade 5-8 | 62 | 8 | 70 | | |
| | Grade 9-12 | 34 | 3 | 37 | | |
| Total | | 177 | 48 | 225 | | |

$p < 0.05$
* is statistically significant
Source: Survey Data (2009)

The result shows that women farmers are in a disadvantageous position. Apantaku, *et al*. (2003) have also reported low educational status of farmers as a limiting factor to make better use of the extension services provided. In this connection, it is vital to integrate literacy and numeracy into the extension programmes for farmers to enhance effectiveness of the PAES.

Wealth Status

In Ethiopia, at present, all farmers have been categorized into poor, medium and better off in terms of their wealth status. This was done so by taking multiple criteria including land size, number of livestock, and monetary

value of crop harvest in the year, housing conditions, and some other considerations. Lists of farmers under those three categories are readily available in the hands of the DAs in each *Kebele*. The purpose of such effort was to channel appropriate support, including extension service provisioning and other material supports in relation to safety net programmes to the respective groups.

The wealth status situation of the respondent farmers and a Chi-square test for independence of the statuses between male and female farmers is given in Table 4. For a statistical reason, the three wealth categories indicated in the methodology of the study have been collapsed into two here, i.e., poor and well off. Accordingly, 100 (56.5%) male farmers, lie in the well off wealth category as opposed to 18 (37.5%) of the female farmers.

**Table 4: Wealth Statuses of Farmers by Sex, and Chi-Square Test for Independence of Statuses**

| **Wealth Statuses** | **Sex** | | **Total** | $\chi^2$ | **Sig** |
|---|---|---|---|---|---|
| | **Male** | **Female** | | 4.73 | 0.03* |
| Poor | 77 | 30 | 107(47.56%) | | |
| Well off | 100 | 18 | 118 (52.44%) | | |
| Total | 177 | 48 | 225 | | |

$p < 0.05$
* is statistically significant
Source: Survey Data (2009)

To see whether wealth status was independent of the sexes a Chi-square test was also conducted and it showed a significant association between wealth status situation of farmers and the sex groups. Female farmers were

significantly poorer than male farmers ($p < 0.05$). This finding has an implication on the necessity of stratifying the PAES based on the target groups. For instance, for poorer groups of farmers more of labour intensive packages are important to capital intensive ones. Several authors have also indicated that women farmers are on the average poorer than male farmers (Belloncle, 1989; Anandajayasekeram, *et al*., 2008; Saito & Weidemann, 1990).

## Land Holding

Table 5 indicates the size of land that the sample farmers possess. It also depicts an independent t-test of difference between the land-holding sizes of male and female headed farmers. The intervals in the first three categories are kept relatively smaller than the other categories in order not to obscure some important distinctions among small-holding farmers by a formidable collapsing.

The average size of land that the respondent farmers possess is 0.89 hectare. This shows that land is so fragmented in the study area. Adesiji, Akinsorotan and Omokore (2010) have reported a land size of as low as one hectare in a study conducted in Nigeria. In the present study, on a comparative basis, the size of land possessed by the male headed households is higher than the mean by 0.05 hectare, but for female headed households it is below the mean by 0.5 hectare.

Significance level of land size difference between the male headed and female headed households was analyzed using an independent t-test; and the result was statistically significant ($p < 0.05$), indicating that, on the average, female headed households have smaller land size than male headed

households. This finding was expected as female headed households were also significantly poorer than male headed households (recall Table 4). Land is a major production factor. Usually smallholding and poor farmers are risk averters in relation to testing new technologies in extension. So, in this aspect female farmers are at a disadvantaged position.

**Table 5: Size of Land Respondent-Farmers Possess by Sex, and Independent t-test for a Difference in Size**

| Size of Land Holding (hectare) | Frequency | | t | Sig. |
|---|---|---|---|---|
| | Male (N = 177) | Female (N = 48) | | |
| 0.10 – 0.25 | 11 | 3 | 3.05 | 0.003* |
| 0.26 – 0.50 | 44 | 21 | | |
| 0.51 – 1.00 | 81 | 18 | | |
| 1.01 – 2.00 | 33 | 5 | | |
| 2.01 – 3.00 | 2 | 1 | | |
| 3.01 – 4.00 | 3 | 0 | | |
| Greater than 4.00 | 3 | 0 | | |

Mean land holding (Male = 0.94, Female = 0.69);
SD (Male = 0.79, Female = 0.39); For both sexes (Mean = 0.89; SD = 0.73)
$p < 0.05$
* is statistically significant
Source: Survey Data (2009)

## Farming Experience

Farming experience of respondent farmers is given in Table 6. To see the relative variation in experience, the data are disaggregated by sex and the mean difference was also analysed using t-test.

Table 6 indicates that the majority of farmers (both males and females) are distributed within the first three experience categories. The mean farming experience was 21.68 with a standard deviation of 10.07. However, as the significance test indicates ($p < 0.05$), female farmers' experience was shorter than that of the male farmers. This is because of the ways through which female farmers become household heads.

**Table 6: Farming Experience by Sex and Independent t-test for Difference in Experience between the Sexes**

| Farming experience (years) | Sex | | t | Sig |
|---|---|---|---|---|
| | Male (n = 177) | Female (n = 48) | | |
| 1-10 | 28 | 8 | 3.84 | 0.000* |
| 11-20 | 61 | 27 | | |
| 21-30 | 54 | 12 | | |
| 31-40 | 24 | 1 | | |
| 41-50 | 8 | 0 | | |
| 51 and above | 2 | 0 | | |

Mean (Male = 22.73, Female = 17.81); SD (Male = 10.52, Female = 6.99)
For both sexes (Mean = 21.68, SD = 10.07)
$p < 0.05$
* is statistically significant
Source: Survey Data (2009)

A female farmer in Ethiopia becomes to be a household head through either 1) when divorced, 2) the husband is not in the homestead for a long period, 3) the husband is seriously sick for a long period and the disease is so recurrent and he cannot shoulder the responsibility of a household head, 4) she is a widow or not married. In short, female farmers become household heads

in most cases as ‘a rescue’ of some kind of problem that emerged through breaking the ‘normal norm’ of male farmers’ headship. Therefore, female farmers’ significantly shorter experience of farming is justified by either of the reasons mentioned.

## Off Farm Activities

Table 7 indicates the proportions of farmers who were engaged in off-farm activities besides farm activities. To assess the influence of sex on off-farm engagement, a Chi-square test of independence was also included in Table 7.

**Table 7: Off-farm Engagement of Farmers and Chi-Square Test for Independence between the Sexes**

| Sex | Engagement in off-farm activities | | Total | $\chi^2$ | Sig. |
|---|---|---|---|---|---|
| | Yes | No | | | |
| Male | 122 | 55 | 177 | 0.45 | 0.50 |
| Female | 30 | 18 | 48 | | |
| Total | 152 | 73 | 225 | | |

$p < 0.05$
Source: Survey Data (2009)

Table 7 shows that the majority of both male and female farmers are engaged in off-farm activities besides farm activities. The significance test also shows that engagement in off-farm activities is independent of sex type ($p > 0.05$). In other words, both male and female farmers were engaged in off-farm activities in reasonably the same proportion implying that off-farm activity is not associated with sex.

In extension work, analysis of off-farm activities of farmers helps the development practitioners to clearly identify 'trade-offs' and complementary gains of farmers as a result of interactions between farm and off-farm activities (Anandajayasekeram, *et al*., 2008). Such information is vital in channelling extension recommendations appropriately. Farmers who engage in off-farm activities can get some benefits which they may not get from their sole farm activities. The enhanced capacity, on the other hand, may help to purchase some necessary farm inputs. Depending on the situation, there could also be competitive relationships between farm and off-farm activities. In such cases, farmers need to be advised to allocate their labour and other scarce resources based on the comparative advantage of the enterprises.

## Types of Off-Farm Activities

Table 8 shows the types of off-farm activities and the proportions of farmers who were engaged in each type. Quite a large number of male and female farmers were engaged in 'petty trading' activities followed by 'being hired on others' farm'. As a third rank, 'carpentry' and 'weaving of *shema*' (local cloth making) follow as the other off-farm activities of male and female farmers, respectively. Knowledge of off-farm engagements of farmers is important to give advices that are practically relevant for the respective clients of extension. In development endeavours, traditional and small scale off-farm activities could be important springboards to establish rural area-adapted cottage industries.

Understanding local activities and enterprises will have two advantages. First, the cottage industries will benefit better the people involved in the activities and serve the users with better quality products and services.

Second, a certain proportion of the farming population can be employed in those cottage industries. This, in turn, reduces the pressure of farming-population on farm-lands.

**Table 8: Types of Off-Farm Activities in which Farmers were Engaged**

| Types of Off-Farm Activities | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | F | % | F | % | F | % |
| Carpentry | 16 | 100 | 0 | 0.0 | 16 | 100 |
| Weaving of *shema* (local cloth) | 1 | 16.7 | 5 | 83.3 | 6 | 100 |
| Embroidery | 0 | 0.0 | 1 | 100 | 1 | 100 |
| Petty trading | 48 | 80.0 | 12 | 20.0 | 60 | 100 |
| Being hired on others' farm | 35 | 83.3 | 7 | 16.7 | 42 | 100 |
| Building | 4 | 100 | 0 | 0.0 | 4 | 100 |
| Blacksmithing and petty trading | 0 | 0.0 | 1 | 100 | 1 | 100 |
| Carpentry and petty trading | 6 | 100 | 0 | 0.0 | 6 | 100 |
| Carpentry and being hired on others' farm | 5 | 100 | 0 | 0.0 | 5 | 100 |
| Embroidery and petty trading | 0 | 0.0 | 3 | 100 | 3 | 100 |
| Petty trading and being hired on others' farm | 7 | 100 | 0 | 0.0 | 7 | 100 |
| Carpentry, petty-trading and being hired on others' farm | 1 | 100 | 0 | 0.0 | 1 | 100 |
| Total | 122 | -- | 30 | -- | 152* | 100 |

*The percentage does not add to 100 due to multiple responses
Source: Survey Data (2009)

Such an effort, aided with family planning programmes helps individual households to own relatively bigger size of farm-land. In such cases, the problem of land fragmentation will be partly addressed. If so, the situation will call for mechanization, for example, use of tractors and combine harvesters.

Systematic integration of farm and off-farm components in a farm household system and use of enhanced technologies in a co-ordinated manner will help to transform the subsistent mode of agriculture, which is characteristic feature of Ethiopian agriculture, to commercialized scale.

House Types of the Respondent Farmers by Sex and Wealth Status

The house type of the respondent farmers and a Chi-square test for independence of house type from sex are given in Table 9. The majority of both male (136 = 76.8%) and female (30 = 62.5%) farmers live in a house with corrugated iron. A Chi-square test conducted to check whether or not house type is independent of sex did not show significant difference between male and female farmers ($p > 0.05$). This signifies both male and female farmers live in proportionally similar thatched and corrugated iron roofing houses.

**Table 9: House Types of the Respondent Farmers by Sex and Chi-Square Test for Independence between Sexes**

| Sex | House Type | | Total | $\chi^2$ | Sig. |
|---|---|---|---|---|---|
| | Thatched Roofing | Corrugated Iron | | | |
| Male | 41 | 136 | 177 | 3.31 | 0.07 |
| Female | 18 | 30 | 48 | | |
| Total | 59 | 166 | 225 | | |

$p < 0.05$
Source: Survey Data (2009)

There was a statistically significant variation ($p < 0.05$) in house type among the respondent farmers that accrue to wealth status differences (Table 10). Significantly higher numbers of poor farmers live in thatched roof house as compared to well off farmers. However, from a focused group discussion with farmers, the researcher learned that, unlike some previous years, now days, thatched roofing is also getting expensive because of the yearly maintenance and scarce availability of grass for roofing as a result of population pressure and environmental degradation.

In the literature, the researcher could not find studies that either support or contradict the relationship between house type and sex or wealth status of farmers.

**Table 10: House Types of Respondent Farmers by Wealth Status and Chi-Square Test for Independence**

| Wealth Status | House type | | Total | $\chi^2$ | Sig. |
|---|---|---|---|---|---|
| | Thatched | Corrugated Iron | | | |
| Poor | 46 | 61 | 107 | 28.02 | 0.000* |
| Well off | 13 | 105 | 118 | | |
| Total | 59 | 166 | 225 | | |

$p < 0.05$
* is statistically significant
Source: Survey Data (2009)

Types of Agricultural Enterprises

In the study area, farmers grow different kinds of perennial and annual crops (Table 11). They also do keep different types of farm animals (Table 12). In Table 11, the number of farmers was included to show how widely or

narrowly that given farm enterprise is undertaken in the area. Accordingly, maize and *enset* (scientifically known as *Enset ventricosum*) are predominantly important crops in the study area, followed by sweet potato, haricot bean, coffee, different kinds of fruit (avocado, mango, banana, papaya, orange and passion fruits) and root crops (taro, cassava, yam and Wolaita potato scientifically known as *Plectranthus edulis*).

**Table 11: Types of Crops Grown and Number of Farmers Involved in by Locations**

| Types of crops | Number of farmers | | | Total |
|---|---|---|---|---|
| | Loc1 | Loc2 | Loc3 | |
| Maize | 22 | 71 | 56 | 149 |
| Wheat | 67 | 7 | 0 | 74 |
| Barley | 42 | 0 | 0 | 42 |
| Teff (*Eragrostis tef*) | 16 | 23 | 14 | 53 |
| Sorghum | 1 | 6 | 2 | 9 |
| Beans | 40 | 2 | 0 | 42 |
| Peas | 34 | 5 | 0 | 39 |
| Haricot bean | 18 | 44 | 53 | 115 |
| Chickpea | 0 | 1 | 7 | 8 |
| Potato | 14 | 3 | 0 | 17 |
| Sweet potato | 32 | 61 | 26 | 119 |
| Different root crops | 11 | 44 | 12 | 67 |
| Different vegetables | 16 | 7 | 0 | 23 |
| Enset (*Enset ventricosum*) | 56 | 41 | 51 | 148 |
| Coffee | 30 | 46 | 51 | 127 |
| Different fruits | 27 | 48 | 25 | 100 |

Source: Survey Data (2009)

In location 1 (loc1) wheat, barley and pulse crops are also important in terms of the number of farmers engaged in them. The highland crops such as wheat, beans, peas and potato were not grown in location 3 (loc3). This is a good indicator for the clear agro-ecological variations between the two locations. Location 2 (loc 2), because of its intermediary position, grows to a certain extent crops that grow both in location 1 and location 3 which represent the cool and hotter *Kebeles* of the study area.

Next, types, mean numbers and standard deviations of farm animals owned by the respondent farmers and a test of difference in possessions in the three locations are indicated in Table 12.

**Table 12: Average Number of Farm Animals Owned by Respondent Farmers and a Test of Difference in Possessions in the Three Locations**

| Animals owned | Loc1 N=75 | | Loc2 N=75 | | Loc3 N=75 | | ANOVA | |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | F-ratio | F-sig. |
| Chicken | 2.56 | 3.14 | 3.51 | 4.25 | 3.71 | 4.86 | 1.64 | 0.196 |
| Goat | --- | --- | --- | --- | 0.11 | 0.71 | --- | --- |
| Sheep | 1.29 | 1.66 | 1.47 | 1.46 | 0.85 | 1.16 | 3.61 | 0.03* |
| Ox/bull | 1.40 | 2.10 | 1.55 | 1.98 | 1.11 | 0.71 | 1.28 | 0.28 |
| Cow/heifer | 1.72 | 1.84 | 2.33 | 3.04 | 1.20 | 0.89 | 5.40 | 0.01* |
| Calf | 0.64 | 1.09 | 1.32 | 1.90 | 0.88 | 0.72 | 5.06 | 0.01* |
| Donkey | 0.24 | 0.43 | 0.17 | 0.45 | 0.19 | 0.43 | 0.49 | 0.61 |
| Mule | 0.05 | 0.23 | 0.01 | 0.12 | --- | --- | 2.69 | 0.07 |
| Horse | 0.03 | 0.23 | --- | --- | --- | --- | --- | --- |

$p < 0.05$
* are statistically significant
Source: Survey Data (2009)

Table 12 indicates that goats, mules and horses were not common in the area of the study. Another important observation in Table 12 is the fact that there were wide dispersions among farmers in animal possession. This is evidently shown by the magnitudes of the standard deviations which are even higher than the mean values in most of the cells.

As the analysis of variance showed, the distribution of chickens, oxen/bulls and donkeys were not significantly different in the three locations. On the other hand, as a Post Hoc LSD test showed, sheep, cows/heifers and calves were distributed in significantly higher number in location 2 (Loc2) than the other two locations.

From Tables 11 and 12 we can learn that farmers in Soddo-zuria *Woreda* are, in general, involved in mixed farming. So, extension provisions need to consider the integration between crop and livestock activities and any emergent complementary or competitive properties as a result of the interactions. However, in a focused group discussion some farmers expressed their view that the extension service is more biased towards crop production and management activities at the expense of the animal production and management activities. Even within crops, some farmers indicated that locally relevant roots such as taro, cassava, yam and Wolaita potato/ *Plectranthus edulis/* were not given attention in the extension service.

## Experience with the PAES

Farmers' experience with the PAES in year is given in Table 13. Most of the farmers have 1 to 10 years of experience with extension. In the case of males, some farmers have experience up to 35 years, whereas the highest year of experience for female farmers was 20 years. The difference in experience

between the male and female farmers was analysed using the independent t-test and it was significant ($p < 0.05$). This indicates that female farmers have shorter years of experience with the PAES than male farmers. This phenomenon puts them at a disadvantageous position as this variable was also found to be associated significantly ($p < 0.05$) with wealth status ($r = 0.18$), motivation ($r = 0.24$), satisfaction ($r = 0.25$), and empowerment ($r = 0.23$) levels of farmers (Table 36, Appendix A). Those extension induced characteristics of farmers are important elements in utilizing extension provisions effectively.

**Table 13: Farmers' Experience with the PAES by Sex and Independent T-test for Difference in Experience between the Sexes**

| Experience (years) | Sex | | t | Sig |
|---|---|---|---|---|
| | Male (N = 177) | Female (N = 48) | | |
| 1-5 | 50 | 18 | **3.65** | **0.000*** |
| 6-10 | 52 | 21 | | |
| 11-15 | 38 | 5 | | |
| 16-20 | 24 | 4 | | |
| 21-25 | 6 | 0 | | |
| 26-30 | 5 | 0 | | |
| 31-35 | 2 | 0 | | |

$p < 0.05$
* is statistically significant
N = 225; Mean (M and F = 10.04, M = 10.7, F = 7.58);
SD (M and F = 6.63, M = 6.93, F = 4.7)
Source: Survey Data (2009)

## General Characteristics of Development Agents

Eighty five development agents (DAs) were included in the study. About78.8 percent of them were male. In terms of their age composition, the mean was 31.56 years with a standard deviation of 6.78. All the DAs were diploma holders – 34 in plant sciences, 23 in animal sciences, and 28 in natural resources. But, at the work place, they work mostly as generalists. The mean year of service as DA was 8.94 with standard deviation of 6.78. General information on age and work experience was given here as informal learning in extension is also affected by them. A predominantly male DAs, is often criticised of being a perennial problem of the extension system of many developing countries (Anandajayasekeram, *et al*., 2008; Saito, *et al*., 1990).

## Extension-induced Characteristics of Farmers

This sub-section addresses the first research question (or objective 1) of the thesis. Objective 1 was formulated to examine extension-induced characteristics of farmers such as farmers' frequency of contact with development agents, and their motivation, satisfaction, empowerment, and participation levels in the PAES. The findings on those variables have been presented by disaggregating with sex under the respective headings, and to see whether scores on the variables were independent of sex of farmers, t-tests were conducted.

### Farmers' Frequency of Contact with Development Agents

Adesiji, Akinsorotan and Omokore (2010) and Monu (1982) argue that farmers' frequency of contact with development agents has a positive

influence on the use of agricultural technologies and on the overall effectiveness of extension. In the present study, frequency of contact was measured in a Likert type scale; and the result has been provided in Table 14. This table includes also a result of analysis of an independent t-test that was conducted to see if there was a difference in mean contacts with DAs between male and female farmers.

**Table 14: Farmers' Frequency of Contact with Development Agents**

| Sex | Mean | SD | t | Sig. |
|---|---|---|---|---|
| Male | 2.50 | 0.94 | | |
| Female | 2.04 | 1.01 | | |
| Both sexes | 2.40 | 0.97 | 2.96 | 0.003* |

$p < 0.05$
* is statistically significant
Scale: 1= Once/month (Very low); 2 = Two times/month (Low); 3 = Three times/month (High); 4 = Four times/month (Very high)
Sources: Survey Data (2009)

Farmers' mean frequency of contact with development agents was 2.40 per month. This value lies within the 'low' range of the scale and is in agreement with reports of several authors (Aphunu & Otoikhian, 2008; Lahai, *et al.*, 2000; Oladosu, 2006; Sarker & Itohara, 2009). In the present study, the data were also disaggregated by sex and the mean difference in frequency of contact between male and female farmers was significant ($p < 0.05$) indicating that, on the average, female farmers do contact with development agents less frequently than male farmers. This could be explained vis-à-vis the female farmers' overall disadvantaged situation in terms of their lower levels of educational status (Table 3), and motivation and satisfaction levels with

extension which will be presented next. These variables have direct relationships with frequency of contact (Table 39).

Farmers' Motivation Level with the PAES

Farmers' motivation level with the PAES was assessed using eight items provided in Table 15. The mean values of the items that constituted the construct 'motivation' range from 1.80 (very low) to 2.66 (low).

**Table 15: Farmers' Motivation Level by the PAES**

| **Motivation Items** | **Mean** | **SD** |
|---|---|---|
| Encouraged to make decisions in relation to farming activities | 2.66 | 0.82 |
| Stimulated to think new things | 2.65 | 0.89 |
| Increased self-initiation as a result of praises for successful performance in farm activities | 2.52 | 0.88 |
| Encouraged to feel as equal partners to the agricultural extension staff in the extension educational programme | 2.40 | 0.83 |
| Encouraged to present viewpoints in meetings | 2.33 | 0.89 |
| Encouraged to carryout participatory monitoring of farm activities | 2.12 | 0.86 |
| Encouraged to be involved in evaluating outcomes of farm activities | 2.03 | 0.81 |
| Encouraged to get assistance from other agencies in relation to specific farm activities and needs | 1.80 | 0.93 |
| **Overall values** | **2.31** | **0.59** |

N (Male = 177, Female = 48); Mean (Male = 2.43, Female = 1.88);
SD (Male = 0.56, Female = 0.53);
Scale: 0 = Not at all; 1 = Very low; 2 = Low; 3 = High; 4 = Very High;
Source: Survey Data (2009)

In relative sense, the PAES has played a better role in assisting farmers make informed decisions and stimulating their thinking in doing new things in farming. However, in some items where the mean values are so low, such as facilitating participatory monitoring and evaluation, and in helping farmers to get necessary assistances from other agencies the PAES need to do much yet to raise the motivational levels of farmers. The overall mean motivation value 2.31 which lies in the low category of the scale was affected by the low mean values of the individual items used in measuring the construct.

Another important finding in this study was the fact that female farmers' motivation level (mean = 1.88) was significantly lower ($p < 0.05$) than male farmers motivation (mean = 2.43) level (Table 36, Appendix A). Besides, the high standard deviation value (0.59) on a Likert type scale of 0 to 4 shows that motivation levels of farmers was highly dispersed.

The observed overall low motivation of farmers with extension was in agreement with what Apantaku *et al.* (2003) found in a study made in Nigeria. Hegde (2005) and Khalil *et al*. (2008) argue that motivating farmers, enhances efficiency and effectiveness of extension educational programmes. Therefore, the PAES need to address the motivational issues of farmers, and in particular that of the female farmers to make the service efficient and effective.

## Farmers' Satisfaction Level with the PAES

Farmers' satisfaction level by extension was assessed using several items as Table 16 shows. The mean values of the items for the construct 'satisfaction' have been presented in descending order. The minimum and maximum mean values were 1.80 (quality of educational materials) and 3.03 (knowledge gained by participating in extension).

**Table 16: Farmers' Satisfaction Level with the PAES**

| Satisfaction Items | Mean | SD |
|---|---|---|
| Knowledge gained by participating in extension | 3.03 | 0.69 |
| Providing unbiased information | 2.92 | 0.73 |
| Clarity of purpose of extension programmes | 2.89 | 0.70 |
| Degree of link of information with farmers' comprehending capacity | 2.84 | 0.92 |
| Up-to-datedness of information | 2.71 | 073 |
| Bringing desired behavioural change in doing farm activities in a better way | 2.69 | 0.71 |
| Facilitating peer learning | 2.61 | 0.76 |
| Convenience of location of FTC | 2.57 | 0.83 |
| Contribution of PAES in increasing farm productivity | 2.56 | 0.77 |
| Convenience of extension demonstration sites and other meeting places | 2.38 | 0.93 |
| Sensitivity to differences related to gender | 2.31 | 0.99 |
| Sensitivity to differences in economic status of farmers | 2.29 | 0.95 |
| Incorporating relevant indigenous practices into extension programmes | 2.23 | 0.87 |
| Facilitating Farmers' Research and Extension activities | 2.22 | 0.77 |
| Linking service with specific needs of farmers | 2.12 | 0.80 |
| Skills gained by participating in extension | 2.12 | 0.72 |
| Sensitivity to differences related to agro-ecological diversity | 1.95 | 0.79 |
| Creating link with other relevant supporting institutions | 1.85 | 0.92 |

**Table 16 Continued**

| Satisfaction Items | Mean | SD |
|---|---|---|
| Appropriateness of extension methods used | 1.84 | 0.83 |
| Quality of educational materials used | 1.63 | 0.81 |
| **Overall values** | **2.37** | **0.41** |

N (Male = 177, Female = 48); Mean (Male = 2.45, Female = 2.10);
SD (Male = 0.40; Female = 0.32)
Scale: 0 = Not at all Satisfied; 1 = Very Low Satisfaction; 2 = Low Satisfaction;
3 = High Satisfaction; 4 = Very High Satisfaction
Source: Survey Data (2009)

If one takes a mean value of 2.5 and above as relatively better achievements, it can be deduced that the PAES has done something good in the first nine of the total twenty-one items, i.e., from 'knowledge gained by participating in extension' to 'contribution of PAES in increasing farm productivity'. By the same argument, if a lower cut point of 2.0 is taken, mean values of the last four items such as sensitivity to differences related to agro-ecological diversity, creating link with other relevant supporting institutions, appropriateness of extension methods used, and quality of educational materials used, have adversely affected the overall mean values of satisfaction which came out to be 2.37. This mean value falls in the 'low' category of the scale.

An independent t-test showed that mean satisfaction of female farmers (2.10) was significantly lower than that of male farmers (2.45); see Table 36, Appendix A. In general, the low mean satisfaction of farmers with extension was in agreement with what Oladosu (2006) and Gebremedihin, Hoekstra and Tegegne (2006) reported.

## Farmers' Empowerment Level by the PAES

Farmers' empowerment level by the PAES was assessed using seven items as indicated in Table 17. The mean values of the seven constituent items of empowerment range from 0.90 to 1.29. Both the minimum and maximum values fall in the 'very low' category of the scale; as a result of which the overall mean empowerment level was so low (1.11). Besides, the mean empowerment level of female farmers (0.99) was statistically lower ($p < 0.05$) than that of male farmers (1.14) as shown in Table 36, Appendix A. This suggests that the contribution of the PAES in enhancing the empowerment levels of farmers was very minimal, in general, and particularly worse for female farmers. This finding is in agreement with the report of the Neuchatèl Group (2004) that states gender disparity in extension services.

**Table 17: Farmers' Level of Empowerment by Participating in the PAES**

| Empowerment Items | Before Participation in extension (a) | | After Participation in Extension (b) | | Net Empowerment Levels (c) ( b – a) | |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| Acquiring tools to critically monitor farm practices | 1.35 | 0.61 | 2.64 | 0.70 | 1.29 | 0.66 |
| Access to information for decision | 1.22 | 0.69 | 2.49 | 0.66 | 1.27 | 0.60 |
| Self-confidence | 1.54 | 0.72 | 2.64 | 0.71 | 1.10 | 0.69 |
| Capacity to initiate innovative practices | 1.64 | 0.65 | 2.74 | 0.74 | 1.10 | 0.64 |
| Integrating local and outside knowledge | 1.37 | 0.64 | 2.46 | 0.81 | 1.08 | 0.69 |
| Capacity to choose through a better decision-making power | 1.68 | 0.64 | 2.72 | 0.69 | 1.05 | 0.64 |
| Developing own solution to a problem | 1.86 | 0.78 | 2.76 | 0.71 | 0.90 | 0.70 |
| **Overall values** | **1.52** | **0.41** | **2.64** | **0.45** | **1.11** | **0.36** |

N (Male = 177, Female = 48); Mean (Male = 1.14, Female = 0.99);
SD (Male = 0.36; Female = 0.33);
Scale: 0 = Not at all empowered; 1 = Very Lowly Empowered; 2 = Lowly Empowered; 3 = Highly Empowered; 4 = Very Highly Empowered
Source: Survey Data (2009)

Farmers' Participation Levels in the PAES

Farmers' participation levels in the different stages of extension programme development and delivery processes were assessed from the perspectives of the farmers themselves and the development agents. The findings have been summarized in Table 18.

**Table 18: Farmers' Participation Levels in the PAES as Perceived by themselves and DAs**

| Stages in Extension Programme Development and Delivery | Farmers | | | DAs (N = 85) | |
|---|---|---|---|---|---|
| | N (%) | Mean | SD | Mean | SD |
| Need assessment and problem identification | 192 (85.3) | 2.44 | 0.65 | 2.80 | 0.73 |
| Identifying alternative courses of actions for extension | 173 (76.9) | 2.10 | 0.66 | 2.77 | 0.61 |
| Identifying appropriate extension educational activities | 156 (69.3) | 1.88 | 0.62 | 2.31 | 0.67 |
| Selecting appropriate extension contents | 131 (58.2) | 1.83 | 0.66 | 2.27 | 0.57 |
| Selecting appropriate methods for extension | 134 (59.6) | 1.73 | 0.64 | 2.20 | 0.65 |
| Monitoring implemented extension programmes | 191 (84.9) | 2.02 | 0.74 | 2.35 | 0.66 |
| Evaluating outcomes of extension programmes | 193 (85.8) | 1.63 | 0.75 | 2.44 | 0.70 |
| **Overall values** | **225 (100)** | **1.91** | **0.45** | **2.50** | **0.44** |

N (Farmers, M = 177, F = 48); Mean (farmers, M = 1.99, F = 1.63, DA and Farmers = 2.07); SD (Farmers, M = 0.42, F = 0.44, DA and Farmers = 0.52)
Scale: 1 = Very Low Participation; 2 = Low Participation;
3 = High Participation; 4 = Very High Participation;
Source: Survey Data (2009)

Table 18 shows many important things about farmers' participation in the PAES. Column 2 indicates the number and percentages of farmers that participate in each of the seven stages of extension programme development and delivery process. The percentages show that not all farmers participate in those respective constituents of the construct 'participation'. In this regard relatively higher number of farmers participated in 'evaluating outcomes of extension programmes', 'need assessment and problem identification' and in 'monitoring implemented extension programmes'. This does not mean, however, there were high levels of participation in those stages of extension programme development and delivery processes.

The respondents' levels of participation are indicated by the mean values of columns 3 and 5. As these two columns show, in both farmers' and DAs' perceived responses, the mean participation levels of farmers in the constituent elements of the construct 'participation' range from 'very low' to 'low' – for farmers 1.63 to 2.44, and for DAs 2.20 to 2.80. As a result, the mean participation levels of farmers as perceived by the farmers themselves and the DAs were 1.91 and 2.50, respectively. Those mean values fall in the 'very low' and 'low' categories of the scale, respectively.

Overall low levels of farmers' participation in extension were reported by other several authors (Berhanu, 2008; Gebremedhin, *et al.*, 2006; Richardson, 2003; Plüss, *et al.*, 2008). The present finding was, however, in contrary to what is stipulated by the Government of Ethiopia, and the federal and regional bureaus of Agriculture and Rural Development (GFDRE, 2002; MoARD, 2006; BoARD, 2007) that claim participatory processes in the extension system.

An independent t-test of means between farmers' own response and the DAs' response indicated that the two means were significantly different ($p < 0.05$), indicating that DAs have rated farmers' participation higher than farmers' own responses. This finding corroborates Kumba (2003) who reported similar observation in a study conducted in Namibia. In addition to this, a test made between the mean participation values of male (1.99) and female (1.63) farmers also showed a statistically significant difference (Table 36, Annex 1). Kemirembe, *et al*. (2007) and Lahai, *et al*. (2000) have also reported differentially low participation levels of female farmers as opposed to their counterpart male farmers.

In summing up the extension-induced characteristics, on top of the low mean values of farmers' frequency of contact with development agents, motivation, satisfaction, empowerment and participation in extension for all farmers, the situations were, particularly, worse for female farmers. In all of these five variables the differences of the mean values between the male and female farmers were significant ($p < 0.05$). There could be several factors that attribute, in an interwoven manner, to the differences of scores between the male and female farmers.

In the preceding sections, it was shown that the female farmers had significantly shorter years of farming experience and participation in extension; low educational and wealth status; and low land size holding. Besides, extension agents were predominantly male. The shorter experience female farmers have both in farming and particularly in extension may have their own disfavouring impacts as change in extension takes place gradually. The same is true with the low educational and wealth statuses, and small size

of land. At least some level of education is a key in extension for effective communication. Berhanu (2008) has, for instance, reported a direct correlation between educational statuses of farmers and effectiveness of extension. Land size and wealth status are, on the other hand, important inputs to put in practice extension recommendations. The dominantly male development agents might have not also served well the extension interests of the female farmers; this last element is, of course, widely documented as a perennial problem in African extension service provisions (Anandajayasekeram, *et al*., 2008; Haug, 1999; Saito & Weidemann, 1990).

### Participation of DAs in the PAES

This sub-section addresses research objective 2 that was formulated to examine level of participation of DAs in the PAES. The finding has been presented in Table 19.

**Table 19: Participation of DAs in the PAES**

| Stages in Extension Programme Development and Delivery | n | Mean | SD |
|---|---|---|---|
| Need assessment and problem identification | 85 | 3.07 | 0.78 |
| Identifying alternative courses of actions for extension | 85 | 2.73 | 0.79 |
| Identifying appropriate extension educational activities | 82 | 2.46 | 0.72 |
| Selecting appropriate extension contents | 78 | 2.32 | 0.71 |
| Selecting appropriate methods for extension | 79 | 2.37 | 0.64 |
| Monitoring implemented extension programmes | 84 | 2.58 | 0.75 |
| Evaluating outcomes of extension programmes | 83 | 2.73 | 0.72 |
| **Overall values** | **85** | **2.62** | **0.42** |

Scale: 1 = Very Low Participation; 2 = Low Participation;
3 = High Participation; 4 = Very High Participation
Source: Survey Data (2009)

Table 19 shows that nearly all the DAs participated in the different stages of extension programme development and delivery process – the minimum number was 78 out of the expected total number 85. All of the DAs participated, particularly, in need assessment and problem identification, and in identifying different courses of actions for extension. For the different stages the mean participation values ranged from 2.32 to 3.07 with an overall mean and standard deviation of 2.62 and 0.42, respectively. This shows that though the DAs participated in the PAES, their overall participation level was low. This finding was in agreement with Sadighi and Mohammadzadeh (2002) who reported low level of participation of extension agents in extension in Iran.

Development agents, as Röling (1988) argue, are one of the essential components in providing extension service to clients. The Soddo-zuria *Woreda* Bureau of Agriculture and Rural Development, therefore, needs to note the gap between the working documents that stipulate participation and the observed realities in order to take necessary measures to enhance DAs' participation in the PAES.

### DAs' Professional and Technical Competences

DAs' professional and technical competences are presented in this sub-section. This sub-section addresses research objective 3 that was set as *'examine professional and technical competences of development agents as perceived by farmers and the development agents themselves'*. First, professional competence is dealt with (Table 20). In Table 20, the items are arranged in a descending order of farmers' mean professional competence

values of Column 2. The mean values in this Column range from 1.55 (Use of appropriate audio-visual aids) to 2.68 (Evaluating programmes with farmers). Low mean value (1.99) for 'Use of appropriate audio-visual aids' as a component of DAs' professional competence was also observed in the DAs' own responses. However, in the DAs' response the highest mean value (3.48) was for 'Supervising farmers'. This value falls in the 'High' category of the scale. For this item the mean value from farmers' response was 2.49 which fall in the 'Low' category.

**Table 20: DAs' Professional Competences as Perceived by Farmers and DAs themselves**

| Professional Competence Items | Farmers (N = 225) | | DAs (N =85) | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| Evaluating programmes with farmers | 2.68 | 0.69 | 3.32 | 0.54 |
| Interpersonal communication | 2.62 | 0.68 | 3.44 | 0.57 |
| Listening to farmers | 2.50 | 0.68 | 3.39 | 0.58 |
| Simplifying technical information | 2.49 | 0.71 | 3.13 | 0.59 |
| Supervising farmers | 2.49 | 0.72 | 3.48 | 0.63 |
| Demonstrating leadership | 2.28 | 0.65 | 3.04 | 0.66 |
| Group communication | 2.23 | 0.68 | 2.67 | 0.66 |
| Monitoring activities with farmers | 2.23 | 0.68 | 3.32 | 0.56 |
| Organising and forming groups | 2.21 | 0.66 | 2.71 | 0.59 |
| Problem solving | 2.17 | 0.70 | 2.91 | 0.61 |

**Table 20: Continued**

| Professional Competence Items | Farmers (N = 225) | | DAs (N =85) | |
|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** |
| Handling sensitively diverse groups' needs | 2.14 | 0.69 | 2.78 | 0.75 |
| Using analogy in communication | 2.06 | 0.79 | 2.65 | 0.77 |
| Facilitating participatory learning and action | 2.05 | 0.68 | 3.07 | 0.59 |
| Use of appropriate audio-visual aids | 1.55 | 0.74 | 1.99 | 0.65 |
| **Overall values** | **2.26** | **0.34** | **2.99** | **0.30** |

N (Farmers, Male = 177, Female = 48);
Mean (Farmers, M = 2.30, F = 2.11, DAs & Farmers = 2.46);
SD (Farmers, M = 0.34, F = 0.31, DAs & Farmers = 0.46)
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

Another contrasting mean values from farmers and DAs responses was for the item 'Facilitating participatory learning and action'; for this item the mean values from farmers and DAs were 2.05 and 3.07, respectively. The farmers' mean value falls in the 'Low' and the DAs' in the 'High' categories. Comparison can continue in this way for the other items, too. The item in point was, however, a good example to demonstrate variations in view points between service providers (DAs) and service receivers (the farmers). Asking a question, in whose point of view is, thus, paramount importance in those kinds of situations.

As a result of the variations in mean values for the constituent items of the construct 'professional competence', the overall mean values (2.26 of farmers, and 2.99 of DAs) were significantly different ($p < 0.05$); see Table

37 in Appendix A. This addresses one of the hypotheses of the study that was stated as:

> *$H_o$: There is no difference in rating on professional competence of development agents between farmers and development agents themselves.*
>
> *$H_1$: There is a difference in rating on professional competence of development agents between farmers and development agents themselves.*

As the t-test (17.43) and its significance ($p < 0.05$) showed, the null hypothesis of no difference in ratings on professional competence of development agents was rejected in favour of the research hypothesis. A statistically significant difference was also observed at the 95% confidence interval between the mean values of male (2.30) and female (2.11) farmers on DAs' professional competence – implying that female farmers evaluated DAs' professional competence lower than the male farmers (Table 37, Appendix A).

DAs' technical competence is presented in Table 21. The items are arranged in a descending order of the magnitude of the mean technical competence values of farmers' responses given in Column 3. With exceptions of small variations, the mean technical competence values from the DAs' response came out to be in descending order somewhat fitting with farmers' responses. This indicates that both farmers and DAs know well strengths and weaknesses of the DAs in technical competences. This was not the case for the professional competence of DAs where there were major mismatches in the ranking orders of the constituent items of the construct 'professional competence' between farmers' and DAs' responses.

**Table 21: DAs' Technical Competences as Perceived by Farmers and DAs themselves**

| Technical Competence Items | Farmers | | | DAs | | |
|---|---|---|---|---|---|---|
| | n | Mean | SD | n | Mean | SD |
| Compost preparation and application | 220 | 3.38 | 0.73 | 84 | 3.54 | 0.65 |
| Timing and ways of fertilizer application | 223 | 3.35 | 0.80 | 84 | 3.50 | 0.63 |
| Knowledge on time of sowing | 225 | 3.31 | 0.73 | 85 | 3.46 | 0.65 |
| Knowledge on appropriate time of harvesting crops | 224 | 3.17 | 0.83 | 84 | 3.44 | 0.68 |
| Land preparation | 225 | 2.96 | 0.68 | 85 | 3.25 | 0.69 |
| Knowledge on post harvest handling of crops | 224 | 2.96 | 0.80 | 84 | 3.26 | 0.73 |
| Demonstrating conservation ploughing | 219 | 2.94 | 0.63 | 85 | 3.29 | 0.55 |
| Livestock feed management | 218 | 2.89 | 0.77 | 82 | 3.06 | 0.76 |
| Livestock breed selection for specific purpose | 217 | 2.88 | 0.74 | 82 | 3.06 | 0.81 |
| AI skills in livestock breeding | 218 | 2.83 | 0.84 | 82 | 3.01 | 0.81 |
| Water harvesting | 165 | 2.79 | 0.82 | 76 | 3.03 | 0.75 |
| Mechanical soil and water Conservation | 215 | 2.77 | 0.68 | 84 | 3.15 | 0.67 |
| Knowledge on irrigation | 155 | 2.71 | 0.74 | 77 | 2.86 | 0.74 |
| Chicken selection for purpose | 170 | 2.68 | 0.80 | 82 | 2.91 | 0.72 |
| Weed identification and management | 224 | 2.65 | 0.78 | 84 | 2.94 | 0.67 |
| Nursery site selection and preparation | 211 | 2.60 | 0.63 | 85 | 2.96 | 0.70 |
| Insect identification and control | 225 | 2.56 | 0.72 | 84 | 2.68 | 0.64 |

**Table 21: Continued**

| Technical Competence Items | Farmers | | | DAs | | |
|---|---|---|---|---|---|---|
| | **N** | **Mean** | SD | **N** | **Mean** | SD |
| Biological soil and water conservation | 214 | 2.29 | 0.66 | 83 | 2.64 | 0.71 |
| Crop disease identification and control | 225 | 2.18 | 0.81 | 84 | 2.46 | 0.65 |
| Livestock disease identification and control | 219 | 2.11 | 0.82 | 82 | 2.28 | 0.55 |
| Providing market information on crops and livestock | 225 | 2.05 | 0.80 | 85 | 2.35 | 0.65 |
| **Overall values** | **225** | **2.77** | **0.39** | **85** | **3.01** | **0.31** |

N (Farmers, Male = 177, Female = 48);
Mean (Farmers, M = 2.80, F = 2.65, DAs & Farmers = 2.83);
SD (Farmers, M = 0.39, F = 0.39, DAs & Farmers = 0.39)
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

From DAs' point of view, technical competence levels were 'high' for the first twelve or 57% of the items. If commonly shared responses of farmers and DAs are taken, 'high' level of technical competences were recorded for the first four items such as 'Compost preparation and application', 'Timing and ways of fertilizer application', 'Knowledge on time of sowing', and 'Knowledge on appropriate time of harvesting crops'. On the contrary, from both farmers' and DAs' responses, lower mean technical competence levels were recorded for the items listed at about the end of Table 21. To emphasize, on both groups of respondents, the mean technical competence levels of DAs were low particularly on items such as 'Providing market information on crops and livestock, 'Livestock and crop disease identification and control', 'Biological soil and water conservation', and 'Insect identification and control'.

An independent t-test showed that the overall mean technical competence values of farmers (2.77) and DAs' (3.01) were significantly different - implying that the development agents have rated themselves in a bit inflated way (Table 37, Appendix A). On top of this, the ratings of male and female farmers on the technical competence of the DAs were significantly ($p < 0.05$) different (Table 37). In other words, female farmers' rating was smaller than the mean rating of male farmers.

In summing up the sub-section on DAs' professional and technical competences, the following remarks are worth important to emphasize. The lower rating on development agents' professional and technical competences by the female farmers could be explained in line with the extension induced characteristics of the female farmers themselves presented previously – poorly motivated, lowly satisfied, less empowered with extension, and low participation in extension. A second likelihood factor could also be the fact that the majority of the development agents were male and they could not satisfactorily demonstrate their professional and technical competences for the female farmers.

Another important observation was the fact that in both the farmers' and the development agents' ratings on DAs' professional and technical competences the ratings on the later were higher than on the former. Khan, Nawab, and Khan (2006) and Aphunu and Otoikhian (2008) have also reported a higher level of technical competencies of development agents as compared to their professional competencies. This implies that attaining professional competence is harder than attaining technical competence. This researcher claims that technical competences can be learnt just like

memorizing recipes at the cognitive level and can be applied at the psychomotor level. But, professional competence is something to do more on the affective domain of learning. In that sense, it requires more reflection and internalization than a technical competency. Thus, to develop professional competency of development agents' more time of training may be required than the current 10+3 diploma programmes.

In Ethiopia, like in many developing countries, the role DAs play in the provision of agricultural extension is immense. In the developed countries farmers can, in most cases, directly get information and advice from the 'pool of knowledge' and subject matter specialists through the use of information and communication technologies (ICT) such as mobile phone, e-mail, internet, fax and the like. For instance, the Israeli Extension Service is well developed in terms of using ICT; and the main objective of the Israeli Extension Service is to replace frontline human labours by technological innovations (Gelb, *et al*., 2009). Ethiopia is not at that stage; so DAs' professional and technical competences have direct impact on the quality of extension service provided to farmers. Therefore, the Bureau of Soddo-zuria *Woreda* in collaboration with other stakeholders need to give emphasise to the development of both the professional and technical competence levels of DAs.

Next, availability and extent of support systems to the PAES have been presented and discussed.

### Support Systems as Perceived by Farmers and DAs

In this sub-section level of support systems to the PAES are presented. The support systems include relevance, timely availability and adequacy of

extension packages; credit facility; markets for agricultural produce; and policy, research and subject matter specialists' support levels. With the exception of the last three (policy, research and SMSs), data were collected from both groups – farmers and DAs. But on policy, research and SMSs issues DAs were more appropriate and data were collected only from them. This sub-section addresses research objectives 4 and 5 that were formulated in relation to the support systems.

## Relevance of Extension Packages

It was noted in chapter one that the Ethiopian PAES strives to improve the wellbeing of farmers through assisting them to adopt packages prepared in the different domains. The relevance levels of the extension packages promoted by the PAES have been given in Table 22 as perceived by both categories of the respondents. The domains of the extension packages have been presented with a descending order of the mean values of farmers' responses on their relevance.

From farmers' responses, the relevance levels of the extension packages in the different domains ranged from 'Very low' such as 'Farm tools' and 'Horticultural crops production' to 'Low' such as 'Fattening' and 'Dairy farming' with relatively higher mean values. From DAs' perspective all mean values fall in the 'Low' category. Owing to the low mean values almost for all the constituent items, the overall mean relevance level of extension packages were 2.14 and 2.23, for farmers and DAs, respectively. These means are almost the same as the test of difference indicated (Table 38, Appendix 1).

**Table 22: Relevance of Extension Packages as Perceived by Farmers and DAs**

| Domains of Extension Package | Farmers | | | DAs | | |
|---|---|---|---|---|---|---|
| | n | Mean | SD | n | Mean | SD |
| Fattening | 205 | 2.33 | 0.68 | 82 | 2.24 | 0.68 |
| Dairy farming | 215 | 2.30 | 0.67 | 80 | 2.03 | 0.62 |
| Livestock feed preparation | 214 | 2.29 | 0.78 | 84 | 2.39 | 0.71 |
| Cereal crops production | 225 | 2.24 | 0.72 | 85 | 2.36 | 0.63 |
| Natural resource management | 220 | 2.18 | 0.73 | 84 | 2.23 | 0.77 |
| Small ruminant production | 157 | 2.18 | 0.68 | 82 | 2.26 | 0.52 |
| Poultry production | 150 | 2.11 | 0.71 | 85 | 2.22 | 0.61 |
| Horticultural crops production | 215 | 1.92 | 0.74 | 85 | 2.28 | 0.65 |
| Farm tools | 220 | 1.88 | 0.96 | 85 | 2.05 | 0.80 |
| **Overall values** | **225** | **2.14** | **0.45** | **85** | **2.23** | **0.35** |

N (Farmers, Male = 177, Female = 48);
Mean (Farmers, M = 2.22, F = 1.82, DAs & Farmers = 2.16);
SD (Farmers, M = 0.41, F = 0.44, DAs & Farmers = 0.42)
Scale: 0 = Not at all; 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

The mean difference between the male (2.22) and female (1.82) farmers was statistically significant, $p < 0.05$, (Table 38). Already the overall mean for farmers was so low, and it became much lower as perceived by the female farmers.

Several writers have indicated that a low relevance level of extension packages as a major problem in agricultural development (Apantaku, Oloruntoba & Fakoya, 2003; Baxter, 1989; Belloncle, 1989; Haug, 1999; Johnson, 2003; Mokone & Steyn, 2005; Oladosu, 2006).

Timely Availability of Extension Packages

The findings of the study are presented in Table 23. Farmers' mean responses on timely availability of the different packages are presented in descending order. Accordingly, fertilizer was in the first rank in being available relatively in time (mean = 3.13). Fertilizer was also on the first place from DAs' responses. The overall means of timeliness of availability of packages were 2.29 and 2.25 for farmers and DAs, respectively. The mean difference was not significant, $p > 0.05$ (Table 38, Appendix A).

**Table 23: Timely Availability of Extension Packages as Perceived by Farmers and DAs**

| | Farmers | | | DAs | | |
|---|---|---|---|---|---|---|
| **Extension Packages** | **N** | **Mean** | **SD** | **N** | **Mean** | **SD** |
| Fertilizer | 222 | 3.13 | 0.79 | 85 | 2.93 | 0.55 |
| Seed for grain | 225 | 2.79 | 0.70 | 85 | 2.69 | 0.69 |
| Horticultural planting materials | 216 | 2.33 | 0.78 | 85 | 2.51 | 0.63 |
| Seed/seedlings for forage | 214 | 2.17 | 0.78 | 83 | 2.29 | 0.51 |
| Livestock feed | 207 | 2.13 | 0.77 | 82 | 1.93 | 0.58 |
| Farm implements | 213 | 2.13 | 0.78 | 85 | 1.99 | 0.73 |
| Necessary Pesticides | 219 | 2.08 | 0.81 | 84 | 2.12 | 0.59 |
| Poultry feed | 141 | 1.87 | 0.75 | 83 | 1.75 | 0.49 |
| Veterinary services | 216 | 1.81 | 0.68 | 82 | 1.96 | 0.58 |
| **Overall values** | **225** | **2.29** | **0.48** | **85** | **2.25** | **0.35** |

N (Farmers, Male = 177, Female = 48); Mean (Farmers, M = 2.32, F = 2.20, DAs & Farmers = 2.28);
SD (Farmers, M = 0.48, F = 0.44, DAs & Farmers = 0.45)
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

The mean difference between male (2.32) and female (2.20) farmers was not also significantly different (Table 38). This implies that all the three sub-groups such as male and female farmers, and DAs perceived similarly the low level timely availability of the packages.

In Table 23 Columns 3 and 6, the mean values from top to bottom show (with slight differences) that the order of timely availability of the packages were almost the same between farmers' and DAs' responses. This indicates the reliability of the responses for development decisions and actions to be made.

## Adequacy of Available Extension Packages

Adequacy levels of extension packages as perceived by farmers and DAs are given in Table 24. The extension package items are listed in a descending order of the means from farmers' responses. But, with the exception of the item 'Veterinary services' listed at the bottom of Table 24, the means from DAs' responses were also in descending order. This indicates that in terms of adequacy of levels of the different extension packages farmers and DAs had almost the same perception. Farmers and DAs' overall means were not also statistically different. In addition, a mean difference test between the male (2.39) and female (2.32) farmers' responses on adequacy of extension packages didn't either show significant variation. These findings imply that the low level adequacy of extension packages was perceived similarly by both the farmers (male and female) and DAs (Table 38, Appendix A).

**Table 24: Adequacy of Extension Packages as Perceived by Farmers and DAs**

| Extension Packages | Farmers | | | DAs | | |
|---|---|---|---|---|---|---|
| | n | Mean | SD | n | Mean | SD |
| Fertilizer | 224 | 3.30 | 0.71 | 85 | 3.41 | 0.79 |
| Seed for grain | 225 | 3.21 | 2.19 | 85 | 2.79 | 0.77 |
| Horticultural planting materials | 215 | 2.46 | 0.80 | 85 | 2.46 | 0.59 |
| Seed/seedlings for forage | 215 | 2.21 | 0.80 | 84 | 2.25 | 0.64 |
| Necessary pesticides | 219 | 2.13 | 0.87 | 83 | 2.17 | 0.62 |
| Farm implements | 213 | 2.09 | 0.79 | 85 | 1.98 | 0.65 |
| Livestock feed | 207 | 2.00 | 0.77 | 83 | 1.93 | 0.49 |
| Poultry feed | 142 | 1.88 | 0.79 | 83 | 1.89 | 0.64 |
| Veterinary services | 215 | 1.80 | 0.67 | 82 | 2.01 | 0.58 |
| **Overall values** | **225** | **2.37** | **0.52** | **85** | **2.33** | **0.39** |

N (Farmers, Male = 177, Female = 48); Mean (Farmers, M = 2.39, F = 2.32, DAs & Farmers = 2.36); SD (Farmers, M = 0.54, F = 0.46, DAs & Farmers = 0.49)
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

In line with the findings, the Soddo-zuria *Woreda* Bureau of Agriculture and Rural Development needs to guarantee satisfaction of extension package-needs of farmers particularly in items listed at about the bottom of Table 24 such as veterinary services, poultry and livestock feed, farm implements and necessary agro-chemicals such as herbicides and insecticides.

Availability of Credit Facility

Availability and adequacy of credit facilities to farmers was assessed as one of the support systems available to the PAES. The responses of farmers (male and female) and development agents on those issues are given in Table 25. About 63.28 percent of the male farmers and 36.72 percent of the female farmers had got credit in the last five years to support their farm activities. Eighty percent of the DAs also stated that farmers have got credits to run their farm activities.

**Table 25: Credit Availability and Adequacy as Perceived by Farmers and DAs**

| Respon-dents | Credit Availability for farmers | | | | Credit Adequacy as to those who said "Yes" | | | |
|---|---|---|---|---|---|---|---|---|
| | Yes | | No | | $\bar{X}$ | SD | t | Sig |
| | F | % | F | % | | | | |
| Male farmers | 112 | 63.28 | 65 | 36.72 | 2.37 | 0.72 | | |
| Female farmers | 24 | 50.00 | 24 | 50.00 | 2.33 | 0.70 | | |
| Male and female farmers | 136 | 60.44 | 89 | 39.56 | 2.36 | 0.72 | 0.21 | 0.84 |
| DAs | 68 | 80.00 | 17 | 20.00 | 2.19 | 0.68 | | |
| Farmers and DAs | 204 | 65.81 | 106 | 34.19 | 2.30 | 0.71 | 1.62 | 0.11 |

$p < 0.05$
N (Farmers, Male = 177, Female = 48; DA's = 85);
Scale: 1 = Very lowly available; 2 = Lowly available; 3 = Highly available; 4 = Very highly available
Source: Survey Data (2009)

With respect to the adequacy of the credit facility, the mean responses of male and female farmers were 2.37 and 2.33, respectively; and that of the

development agents' was 2.19. Both the farmers' and DAs' mean responses fall in the category of 'lowly available'. In Table 25, independent t-tests were also included to see if there were differences in perceived adequacy of credit between male and female farmers, and farmers as a whole and development agents. Both tests showed that there were not statistically significant differences between the means of the groups ($p > 0.05$, in both tests). This shows that the low level of credit facility availability was recognized in the same manner by both male and female farmers and the development agents. Lack and inadequacy of credit facilities as limiting factors in agricultural production was also reported by Plucknett (2004) and Oladosu (2006).

## Availability of Markets for Agricultural Produce

Availability of market is a driving force in agricultural production (Bagamba, 2007; Boyle, 1921; Rivera & Alex, 2004; Van den Ban, 2002). The degree of availability of market for the common agricultural produce in the study area is given in Table 26. Table 26 shows that the responses of farmers and DAs on availability of markets were almost the same both in the magnitudes of the means and the order of market availability values for the respective agricultural produce. Both farmers and DAs indicated that there was 'high' level of market availability for the majority of the agricultural produce. Mean values on availability of market were small only for items listed at about the bottom of Table 26 such as particularly for 'leafy vegetables' and 'root crops'. In fact, DAs' response shows that 'milk' and 'fruits' had low market availability; in farmers' response availability of market for milk and fruits was high.

**Table 26: Availability of Markets for Agricultural Produce as Perceived by Farmers and DAs**

| Types of Farm Produce | Farmers | | | DAs | | |
|---|---|---|---|---|---|---|
| | n | Mean | SD | n | Mean | SD |
| Eggs | 156 | 3.64 | 0.65 | 84 | 3.64 | 0.63 |
| Butter | 215 | 3.52 | 0.63 | 84 | 3.21 | 0.70 |
| Chicken | 143 | 3.45 | 0.69 | 84 | 3.56 | 0.63 |
| Sheep | 147 | 3.41 | 0.62 | 84 | 3.40 | 0.66 |
| Fatten animal | 208 | 3.35 | 0.69 | 84 | 3.08 | 0.72 |
| Cereal crops | 225 | 3.29 | 0.73 | 85 | 3.08 | 0.49 |
| Fruits | 214 | 3.06 | 0.76 | 85 | 2.88 | 0.63 |
| Milk | 208 | 3.06 | 0.66 | 83 | 2.84 | 0.69 |
| Root crops | 223 | 2.69 | 0.87 | 85 | 2.53 | 0.63 |
| Leafy vegetables | 207 | 2.59 | 0.66 | 85 | 2.47 | 0.59 |
| **Overall values** | **225** | **3.17** | **0.47** | **85** | **3.07** | **0.41** |

N (Farmers, Male = 177, Female = 48);
Mean (Farmers, M = 3.21, F = 2.99, DAs & Farmers = 3.14);
SD (Farmers, M = 0.43, F = 0.56, DAs & Farmers = 0.46)
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

The overall mean market availability from farmers' and DAs' responses were 3.17 and 3.07, respectively. The difference between these mean values was not statistically significant ($p > 0.05$). However, there was a statistically significant difference ($p < 0.05$) in the mean values of the male (3.21) and female (2.99) farmers in terms of availability of market for the agricultural produce (Table 38, Appendix A). This could be, unlike the male counterparts, female farmers might not be able to exploit distant market niches

for their produces. As Rivera and Alex (2004) ascertain the reality of today's agriculture is to survive and be productive in the competitive and market-oriented climate of the time. So, female-headed households need to also develop capacity to compete with male-headed households in the market. In this aspect the PAES needs to do much. Van den Ban (2009), in a more pragmatic approach pointed out that increasing the ability of farmers, in this case particularly female farmers, to compete in the market is essential in the betterment of their standard of living.

## Availability of Policy Support to PAES

The levels of policy supports to the PAES in the various required areas are given in Table 27. Mean values for most of the constituent items of the construct 'policy support' fall in the 'very low' category of the scale. However, in 'allocating adequate number of DAs in the work place' and in 'establishing farmers' training centres (FTC)' where the mean values were 3.26 and 2.85 there were better levels of policy support.

As a result of the small mean values for most of the constituent items, the overall mean of policy support to the PAES was 2.02. This value falls in the 'low' category of the scale. Low policy support to agricultural extension was also reported by Haug (1999) and ODI (2002). With a close look at of Table 27, it can be concluded that policy support levels that have to do at the country and Region level were relatively better compared to policy support levels at the *Woreda* level. Good examples for this statement are the mean values for the items listed at about the bottom of Table 27 including 'availing transport to DAs', 'creating experience-sharing opportunities for DAs', and

'facilitating DAs' self-directed experiential-learning by arranging required materials and logistics'. The *Woreda* Bureau of Agriculture and Rural Development, therefore, needs to provide the necessary policy support to the PAES in order to enhance effectiveness of the service given to farmers.

**Table 27: Availability of Policy Support to PAES as Perceived by DAs**

| **Policy Support Items** | **Mean** | **SD** |
|---|---|---|
| Allocating adequate number of DAs | 3.26 | 0.82 |
| Establishing Farmers' Training Centres | 2.85 | 0.72 |
| Establishing farmers' cooperative-groups | 2.38 | 0.85 |
| Facilitating establishment of Farmers' Research and Extension Groups | 2.18 | 0.79 |
| On-job training for DAs | 2.12 | 0.82 |
| Establishing offices for DAs | 1.98 | 0.69 |
| Facilitating farmers' self-directed experiential-learning by arranging required materials and logistics | 1.88 | 0.81 |
| Motivating DAs | 1.72 | 0.61 |
| Allocating budget for Survey activities | 1.64 | 0.67 |
| Setting up development career for DAs | 1.64 | 0.63 |
| Facilitating DAs' self-directed experiential-learning by arranging required materials and logistics | 1.56 | 0.63 |
| Creating experience-sharing opportunities for DAs | 1.53 | 0.68 |
| Availing transport to DAs | 1.53 | 0.61 |
| **Overall values** | **2.02** | **0.47** |

N = 85
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

Availability of Research and SMS Support to the PAES

Research and Subject Matter Specialists' (SMSs) support levels to the PAES are presented in Table 28. These support systems are presented together in one table because the constituent items listed in the first column were the same for both variables.

**Table 28: Research and SMSs Support to the PAES as Perceived by DAs**

| | Research | | SMSs | |
|---|---|---|---|---|
| **Extension Intervention Domains** | **Mean** | **SD** | **Mean** | **SD** |
| Cereal crops production and mgt | 2.68 | 0.68 | 2.32 | 0.68 |
| Horticultural crops production and mgt | 2.48 | 0.65 | 2.29 | 0.61 |
| Natural resource mgt | 2.46 | 0.68 | 2.36 | 0.65 |
| Animal feed preparation and mgt | 2.40 | 0.62 | 2.21 | 0.67 |
| Poultry production and mgt | 2.36 | 0.61 | 2.17 | 0.62 |
| Dairy farming | 2.20 | 0.71 | 2.33 | 0.65 |
| Small ruminant production and mgt | 2.18 | 0.66 | 2.20 | 0.60 |
| Fattening | 2.18 | 0.63 | 2.36 | 0.74 |
| Farm tools | 2.08 | 0.66 | 1.99 | 0.70 |
| **Overall values** | **2.34** | **0.38** | **2.25** | **0.33** |

N = 85
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

With regard to research support to the PAES in the various domains presented in Table 28, the means ranged between 2.08 (for farm tools) to 2.68 (for cereal crops production and management); and the overall mean research support was 2.34. For SMSs support the minimum and maximum mean values

were 1.99 (for farm tools) and 2.36 (for natural resource management and fattening). Mean SMSs support was 2.25. The overall mean values for both research and SMSs support to the PAES fall in the 'low' category of the scales. The low level of research support to extension was in line with assertions of several other authors (Agbamu, 2000; Apantaku, *et al.,* 2003; Borlaug, 2004; Haug, 1999; Moris, 1989; Plüss, *et al.,* 2008; Rivera & Alex, 2004). The low level SMSs support found in this study was also consistent with what Jonson (2003) reported in a study conducted in Nigeria.

### Effectiveness Level of the PAES as Perceived by Farmers and DAs

Effectiveness of the PAES was measured on a Likert-type scale of 4; 1 and 4 indicating very low and very high, respectively. Table 29 shows the effectiveness levels as perceived by the two categories of respondents – farmers and DAs.

**Table 29: Farmers' and DAs' Perceived Effectiveness Level of the PAES**

| Respo-ndents | Scale | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | Total | Mean | SD |
| Farmers | 50(22.2) | 61(27.1) | 91(40.4) | 23(10.2) | 225(100) | 2.39 | 0.94 |
| DAs | 5(5.9) | 24(28.2) | 45(52.9) | 11(12.9) | 85(100) | 2.73 | 0.76 |

Numbers in brackets represent percentages
Scale: 1 = Very Low; 2 = Low; 3 = High; 4 = Very High
Source: Survey Data (2009)

If one takes effectiveness levels 3 and 4 together as positive states as opposed to levels 1 and 2, it can be argued that 50.6 percent of the farmers and

65.8 percent of the DAs responded that the PAES is effective. But the mean response values, 2.39 for farmers and 2.73 for DAs, indicate that the overall effectiveness level of the PAES lies in the 'Low' category of the scale.

Effectiveness level of the PAES was also determined, as Tables 30 and 31 indicate, by disaggregating the data into responses of sub-groups of the respondents. Table 30 shows that:

- there was a statistically significant difference ($p < 0.05$) in mean rating on effectiveness of the PAES between male and female farmers. Due to this finding, the hypothesis that *'there is no difference in rating on effectiveness of the PAES between male and female farmers'* was rejected in favour of the alternative hypothesis. The low mean effectiveness response of female farmers on the PAES corroborates Lahai, *et al.* (2000). In fact, other several authors have also documented the disadvantaged situation of female farmers in extension services (Anandajayasekeram, *et al.,* 2005, 2008; Belloncle, 1989; Commonwealth Secretariat, 2001; FAO & World Bank, 2000; Haug, 1999; Hedge, 2005; Katungi, *et al*., 2008; Nwachukwu, 2005; Percy, 2001; Saito & Weidemann, 1990; World Bank, 1996);

**Table 30: Difference in Effectiveness of the PAES by Sex, Status and Educational Levels of farmers**

| Respondents | N | $\bar{X}$ | SD | t | Sig |
|---|---|---|---|---|---|
| **Sex difference** | | | | | |
| Male farmers | 177 | 2.62 | 0.88 | | |
| Female farmers | 48 | 1.52 | 0.62 | | |
| Male and female farmers | 225 | 2.39 | 0.94 | 9.92 | 0.000* |
| **Age difference** | | | | | |
| Age >= 42 | 103 | 2.40 | 0.87 | 0.17 | 0.87 |
| Age < 42 | 122 | 2.38 | 1.00 | | |
| **Status difference** | | | | | |
| Development agents | 85 | 2.73 | 0.76 | | |
| Farmers and development agents | 310 | 2.48 | 0.91 | 3.30 | 0.001* |
| **Educational status difference** | | | | | |
| Illiterate groups | 76 | 1.55 | 0.68 | | |
| Literate groups | 149 | 2.81 | 0.76 | | |
| Illiterate and Literate | 225 | 2.39 | 0.94 | 12.20 | 0.000* |

$p < 0.05$
* are statistically significant
Scale: 1 = Very low; 2 = Low; 3 = High: 4 = Very high
Source: Survey Data (2009)

- there was not a statistically significant difference ($p > 0.05$) in mean rating on effectiveness of the PAES between relatively younger and older groups of farmers. This finding partly addresses objective 8 of the research. In the literature, regarding with the relationship of age of farmers with effectiveness of extension, there is no consistency. Adesiji, Akinsorotan, and Omokore (2010) reported non-existence of relationship between the two variables. On the other hand, Belloncle (1989) and Nwachukwu (2005) reported contradicting findings. According to the former author, young farmers benefit more from extension owing to their versatile nature. But, the latter author reported that young farmers are rather less beneficiary of extension owning to resource limitations;
- there was statistically significant difference in mean effectiveness of the PAES ($p < 0.05$) between farmers' and DAs' responses. Mean effectiveness levels of the PAES from the DAs' responses was higher than that of the farmers. Thus, the null hypothesis that '*there is no difference in rating on the effectiveness of the public agricultural extension service between farmers and development agents'* was rejected. The fact that mean rating of the development agents was higher than that of the farmers was somehow expected as development agents are from the service delivering side though they are also equally accountable for farmers;
- there was significant difference ($p < 0.05$) in rating on effectiveness of the PAES between illiterate and literate groups of farmers. This finding addresses partly objective eight of the research. The mean

effectiveness response of the illiterate farmers was lower than the literate groups. Owing to this, the null hypothesis that '*there is no difference in ratings on the effectiveness of the PAES between illiterate and literate groups of farmers'* was rejected. Some other authors have also reported a direct relationship between educational levels of farmers and effectiveness of extension (Belloncle, 1989; Hedge, 2005; Weir & Knight, 2000). In this regard, Belloncle (1989), FAO and World Bank (2000), and UNESCO (2005) recommend integrating literacy and numeracy programmes in extension to make the service more effective. The other two variables 'wealth status' and 'location' of farmers had three categories and for convenience the findings are presented in Table 31 separately.

**Table 31: Difference in Effectiveness of Extension by Wealth Status and Locations of Farmers**

| | | | | ANOVA | |
|---|---|---|---|---|---|
| **Variables** | **n** | $\bar{X}$ | **SD** | **F-ratio** | **Sig.** |
| **Wealth status** | | | | 37.73 | 0.000* |
| Poor | 107 | 1.93 | 0.84 | | |
| Medium | 97 | 2.69 | 0.80 | | |
| Better off | 21 | 3.33 | 0.80 | | |
| **Locations** | | | | 0.10 | 0.901 |
| Loc1 | 75 | 2.37 | 0.94 | | |
| Loc2 | 75 | 2.36 | 1.00 | | |
| Loc3 | 75 | 2.43 | 0.90 | | |

$p < 0.05$;
* is statistically significant
Scale: 1 = Very low; 2 = Low; 3 = High: 4 = Very high
Source: Survey Data (2009)

In Table 31, we can see that the difference in mean values of effectiveness of extension among farmers of the different wealth status was statistically significant ($p < 0.05$). Therefore, the null hypothesis that '*there is no difference in ratings on the effectiveness of the PAES among farmers of the three wealth categories'* was rejected. However, the mean effectiveness levels of the PAES attributed to locations was insignificant ($p > 0.05$). Location wise, effectiveness of extension was similarly low in Loc1, Loc2 and Loc3. In this regard, the study failed to reject the null hypothesis that '*there is no difference in ratings on the effectiveness of the PAES among farmers of the three locations'*.

For the significant difference among the wealth status groups of farmers a further Post Hoc test was made using LSD, Tukey HSD, and Bonferroni. All the three ways of testing gave the same results that the mean of the poor category (1.93) was lower than the medium category (2.69) and the medium category was lower than the mean of the better off category (3.33), $p < 0.05$ for all mean differences.

The findings summarized in Tables 30 and 31 in relation to different sub-groups of the research subjects have practical implications on the types of extension recommendations to be made to farmers. In most of the cases, extension recommendations are made in line with convincing farmers to adopt a certain technology irrespective of farmers' characteristics. In such regards the recommendations may not be utilized owing to limitations of capacity or non-relevance of the technology in relation to the specific characteristics of the farmers in consideration. Such types of recommendations will benefit only the better off categories of farmers, but, for instance, economically

disadvantaged groups will remain marginalized. To address the needs and problems of those economically disadvantaged groups, it is possible, through a well thought extension programme planning, to make extension recommendations more of labour intensive alongside capital intensive ones. In that case, farmers can use their and their family labour and still they can have some level of productivity in their areas of engagements.

Next to this, the relationships between the numerous independent variables and the dependent variable, effectiveness of the PAES have been further investigated using correlation matrix and multiple regressions.

## Relationships between Variables and Best Predictors of Perceived Effectiveness Levels of the PAES

In this section for both the farmers' and development agents' sets of data results of correlation and multiple linear regression analyses are presented to see relationships. First, a correlation matrix between the numerous independent variables and the dependent variable, effectiveness of the public agricultural extension service in addressing farmers' needs is presented. Then results of multiple linear regression analyses follow. For both sets of data many independent variables were included in the study. This is because as some authors argue many of the concepts used to describe human behaviour do consist of rather a number of aspects (Bryman & Cramer, 2005; Healey, 2002).

Relationship between the Independent and Dependent Variables

In the data sets of farmers and DAs', many of the independent variables were the same. To make comparison easier and at the same time save space, the correlation coefficients for the two data sets have been presented side by side in Table 32. In both data sets, the strengths of the associations between the independent variables and the dependent variable (effectiveness of the PAES) ranged from negligible to very strong. This explanation is according to Davis (1971) who defines magnitudes of associations between variables as follows: 0.70 and higher as very strong, 0.50 to 0.69 as substantial, 0.30 to 0.49 as moderate, 0.10 to 0.29 as low, and 0.01 to 0.09 as negligible associations.

In Table 32, it is vivid that in the farmers' data set (the left side column of the correlation coefficient) out of the 19 independent variables 13 are significantly correlated with effectiveness of extension; whereas, in the data set of the development agents out of the 15 independent variables included only 6 were significantly correlated with the dependent variable. Table 32 enables us to address, specifically, the research objective 7 which was '*to determine the relationship between perceived effectiveness levels of the PAES and the independent variables as perceived by farmers and development agents*; and the two hypotheses that were formulated that: i.) $H_o$*: There is no relationship between level of relevance of extension packages and effectiveness of the PAES as perceived by farmers and DAs*; and ii.) $H_o$*: Farmers' level of participation in extension does not have any relationship with their rating on effectiveness of the PAES*

**Table 32: Correlation Matrix between the Independent Variables and the Dependent Variable, Effectiveness of the PAES**

| Independent variables | Correlation Coefficients | |
|---|---|---|
| | Farmers' (N = 225) | DAs' (N = 85) |
| Sex of Farmer | 0.48** | --- |
| Educational level of farmers | 0.68** | --- |
| Location of farmer | 0.02 | --- |
| Wealth status of farmer | 0.50** | --- |
| Number of years farmer stayed in farming | 0.07 | --- |
| Frequency of farmer's contact with DAs | 0.37** | --- |
| Farmer's years of participation | 0.15* | --- |
| Overall motivation | 0.67** | --- |
| Overall satisfaction | 0.62** | --- |
| Overall farmers' participation in extension | 0.78** | 0.83** |
| Overall DAs' professional competence | 0.53** | 0.12 |
| Overall DAs' technical competence | 0.36** | 0.08 |
| Overall relevance of extension packages | 0.79** | 0.84** |
| Overall timely availability of extension packages | 0.05 | 0.00 |
| Overall adequacy of extension packages | 0.06 | 0.04 |
| Overall market availability for agricultural produce | 0.11 | 0.10 |

**Table 32: Continued**

| Independent variables | Correlation Coefficients | |
|---|---|---|
| | Farmers' (N = 225) | DAs' (N = 85) |
| Overall farmers' net empowerment | 0.22** | --- |
| Obtaining credit in the last five years | 0.16* | 0.04 |
| Adequacy of credit obtained (Farmers = 136, DAs = 68) | 0.14 | 0.01 |
| Sex of DA | --- | 0.19 |
| Age of DA | --- | 0.47** |
| Years of service as DA | --- | 0.51** |
| DAs' participation | --- | 0.69** |
| Overall policy support level | --- | 0.18 |
| Overall research support level | --- | 0.51** |
| Overall SMS support | --- | 0.79** |

$p < 0.05$
Source: Survey Data (2009)

Relevance of extension packages was very strongly and significantly ($p < 0.05$) associated with effectiveness of extension in both the farmers' ($r = 0.79$) and development agents' ($r = 0.84$) sets of data. So, the null hypothesis of no relationship was rejected. Likewise, in both data sets, farmers' participation in extension was associated very strongly ($r = 0.78$ for farmers' and $r = 0.83$, for DAs') and significantly ($p < 0.05$) with effectiveness of

extension. As a result, the null hypothesis of no relationship between these variables was also rejected.

In the next sub-section, results of analyses of multiple linear regression on the independent variables and the dependent variable, effectiveness of the PAES, as perceived by both the farmers and the DAs have been presented, discussed and best predictors have been identified.

## Best Predictors of Perceived Effectiveness of the PAES

Regression, like correlation, indicates relationships. However, the former, unlike the latter, presumes causal links between or among independent variable(s) and a dependent variable. For mutual understanding among readers of regression, terms such as regressand, endogenous, or explained variable are also interchangeably used to refer to the dependent variable; likewise, regressors, exogenous, or explanatory variables are also used to refer to the independent variables (Gupta, 1999).

To predict magnitudes of change in the dependent variable, effectiveness of the PAES, with units of change in the respective predictor variables, analyses of multiple linear regressions, also referred to Ordinary Least Squares (OLS) were made for both the farmers' and development agents' sets of data. The results of the regression analyses have been presented in Tables 33 and 34. In so doing, proper analysis of collinearity, also called multicollinearity, was made. Gupta (1999) reminds us that existence of collinearity needs to be checked in a situation where i) two or more independent variables are highly correlated ($r > 0.75$, in absolute terms), ii) R-square is 0.75 and above, and iii) only a few t-values are significant. If

collinearity exists the estimated regression coefficients and t-statistics might not isolate properly the unique effect of each variable and the confidence with which one presumes the effect to be true.

Keeping all remarks of Gupta (1999) in mind, collinearity diagnoses were made and there were no such problems. For a detailed observation of values of correlations between the independent variables themselves, in both the data sets of farmers and DAs, see Tables 39 and 40 (in Appendix A), respectively.

In both the farmers' and DAs' responses, the models were fit to the data because the significance values of the F-statistic in the ANOVA were below 0.05 (95% confidence interval). Therefore, the dependent variable, effectiveness of the PAES (Y) can be explained with two models: i) model from farmers' perception, and ii) model from development agents' perception. According to farmers' perceptions, relevance of extension packages ($X_1$); farmers' participation in extension ($X_2$); farmers' motivation by extension ($X_3$); educational status of farmers ($X_4$); wealth status of farmers ($X_5$); sex of farmers ($X_6$); DAs' professional competence ($X_7$); and farmers' satisfaction with extension ($X_8$) were found to be important predictors of effectiveness of the PAES. These eight variables together explained about 84% of the variance ($R^2$, the coefficient of multiple determination was 0.836) in the dependent variable, effectiveness of the PAES. The adjusted $R^2$ was used it is a more conservative estimate than the ordinary $R^2$ of the amount of variance in a dependent variable (Bryman & Cramer, 2005).

**Table 33: Stepwise Multiple Regression on the Independent Variables and the Dependent Variable, Effectiveness of the PAES, as Perceived by Farmers**

| Predictors | β-weight | t | Sig. | $R^2$ | Adj. $R^2$ | Adj. $R^2$ Δ | F Reg. | F Sig. |
|---|---|---|---|---|---|---|---|---|
| α | -2.177 | -9.99 | 0.000 | | | | 144.233 | 0.000* |
| $X_1$ | 0.277 | 6.58 | 0.000 | 0.625 | 0.623 | 0.623 | | |
| $X_2$ | 0.237 | 5.45 | 0.000 | 0.722 | 0.720 | 0.097 | | |
| $X_3$ | 0.109 | 2.91 | 0.004 | 0.767 | 0.764 | 0.044 | | |
| $X_4$ | 0.215 | 6.06 | 0.000 | 0.800 | 0.797 | 0.033 | | |
| $X_5$ | 0.113 | 3.34 | 0.001 | 0.817 | 0.813 | 0.016 | | |
| $X_6$ | 0.118 | 3.84 | 0.000 | 0.831 | 0.826 | 0.013 | | |
| $X_7$ | 0.106 | 3.29 | 0.001 | 0.839 | 0.834 | 0.008 | | |
| $X_8$ | 0.079 | 2.14 | 0.033 | 0.842 | 0.836 | 0.002 | | |

N = 225; $p < 0.05$
* is significant

Where:
α = Intercept; $X_1$ = Relevance of extension packages;
$X_2$ = Farmers' participation in extension; $X_3$ = Farmers' motivation by extension; $X_4$ = Educational status of farmers;
$X_5$ = Wealth status of farmers; $X_6$ = Sex of farmer;
$X_7$ = DAs' professional competence; $X_8$ = Farmers' satisfaction with extension
Source: Survey Data (2009)

The equation of the first model is:

$$Y = \alpha + \beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+e.$$

Where, $\beta_1$ to $\beta_8$ are the regression coefficients for the eight independent variables; and *e* is an error term which points out the proportion of the

variance in the dependent variable, effectiveness of the PAES, that is not explained by the regression equation. In other words, the error term is the residue obtained when we compute $1-R^2$. This is a measure of the unexplained variance in the dependent variable which may arise as a result of some combinations of the influence of other variables, measurement errors, and random chances. If the model is appropriate for the data, the distribution of the residuals will show a normal curve (Bryman & Cramer, 2005).

Substituting the values for α, and β-weights we get: $Y = - 2.177+0.277X_1+0.237X_2+0.109X_3+0.215X_4+0.113X_5+0.118X_6+ 0.106X_7 +0.079X_8+e$.

As the standardized coefficients are used, one can directly see the magnitude and contribution of each independent variable to the dependent variable. For instance, for one unit standard deviation change in relevance of extension package ($X_1$) there will be 0.277 unit of standard deviation change in the effectiveness of the PAES. This will be true with the effect of all the other independent variables in the equation being partialled out or controlled. In this regard the multiple regression coefficients are "analogous to partial correlation coefficients and represent the direct effect of the associated independent variable on Y" (Healey, 2002, p.435).

For the other seven independent variables we can conclude that their contribution on the change of the dependent variable, effectiveness of the PAES, will be in accordance with the magnitude of their coefficients – this statement holds true for standardized coefficients like the ones here, otherwise, for unstandardized coefficients it is not possible to compare differences in

contributions because of variations in units of measurement of the different independent variables.

For the data set of farmers, the proportions of explained and unexplained (residual) variance can also be depicted with the help of a normal probability plot as follows. Values on the X-axis are observed cumulative probabilities; and those on the Y- axis are expected cumulative probabilities. In a perfect prediction (100%), which is actually very unlikely, the unexplained quantity would be 0%. In other words, the predicted and actually observed values of the dependent variable would be the same.

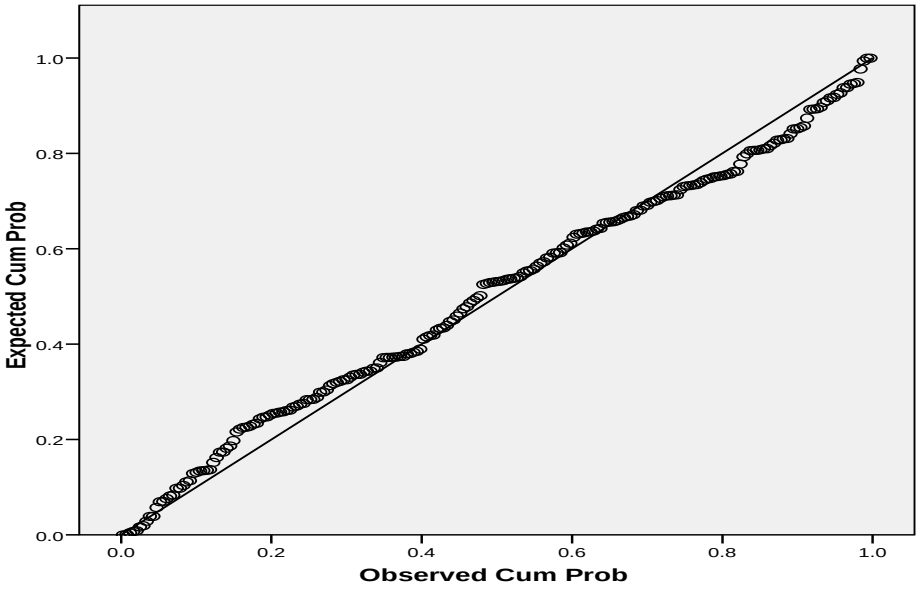


**Figure 9: Graphical Presentation of Explained and Unexplained Variance in the Dependent Variable, Effectiveness of the PAES, as Perceived by Farmers**

Source: Survey Data (2009)

In the second model (development agents' perception), the following five independent variables, i.e., relevance of extension packages ($X_1$); farmers' participation in extension ($X_2$); research support to extension ($X_3$); subject

matter specialists' support to extension ($X_4$); and development agents' participation in extension ($X_5$) were the important predictors of the dependent variable, effectiveness of the PAES.

**Table 34: Stepwise Multiple Regression on the Independent Variables and the Dependent Variable, Effectiveness of the PAES, as Perceived by DAs**

| Predictors | β-weight | t | Sig. | $R^2$ | Adj. $R^2$ | Adj. $R^2\Delta$ | F Reg. | F Sig. |
|---|---|---|---|---|---|---|---|---|
| α | -2.783 | -11.23 | 0.000 | | | | 123.407 | 0.000* |
| $X_1$ | 0.343 | 5.61 | 0.000 | 0.699 | 0.695 | 0.695 | | |
| $X_2$ | 0.337 | 5.86 | 0.000 | 0.839 | 0.835 | 0.140 | | |
| $X_3$ | 0.185 | 4.36 | 0.000 | 0.861 | 0.855 | 0.020 | | |
| $X_4$ | 0.170 | 2.78 | 0.007 | 0.878 | 0.872 | 0.017 | | |
| $X_5$ | 0.132 | 2.41 | 0.019 | 0.887 | 0.879 | 0.007 | | |

N = 85; $p < 0.05$;
* is significant
Where:
α = Intercept; $X_1$ = Relevance of extension packages;
$X_2$ = Farmers' participation in extension; $X_3$ = Research support to extension;
$X_4$ = Subject matter specialists' support to extension; and
$X_5$ = Development agents' participation in extension
Source: Survey Data (2009)

The first two predictors, i.e., relevance of extension packages; and farmers' participation in extension were the same as in the first model. In this model, the coefficient of the multiple determination, $R^2$, was 0.879. So, this model explains about 88 percent of the variation in the dependent variable, effectiveness of the PAES. The meanings of *Y*, *α*, *β's* and *e* being the same as explained in connection with the first model, substituting their values yields the equation:

$Y = -2.783+0.343X_1+0.337X_2+0.185X_3+0.170X_4+0.132X_5+e.$

As the explanation is the same to what was made in connection to the first model, it is not necessary to repeat explaining the contribution of each independent variable to the dependent variable. But, we can generalize that relevance of extension package was the most important predictor, followed by farmers' participation in extension; research support to extension; subject matter specialists' support to extension; and development agents' participation in extension – again this kind of comparison was possible because the coefficients were already standardized.

With a similar approach to the first model, the explained and unexplained variance of the dependent variable, effectiveness of the PAES can be shown with the help of a diagram as follows. Values on the X-axis are observed cumulative probabilities; and those on the Y- axis are expected cumulative probabilities.

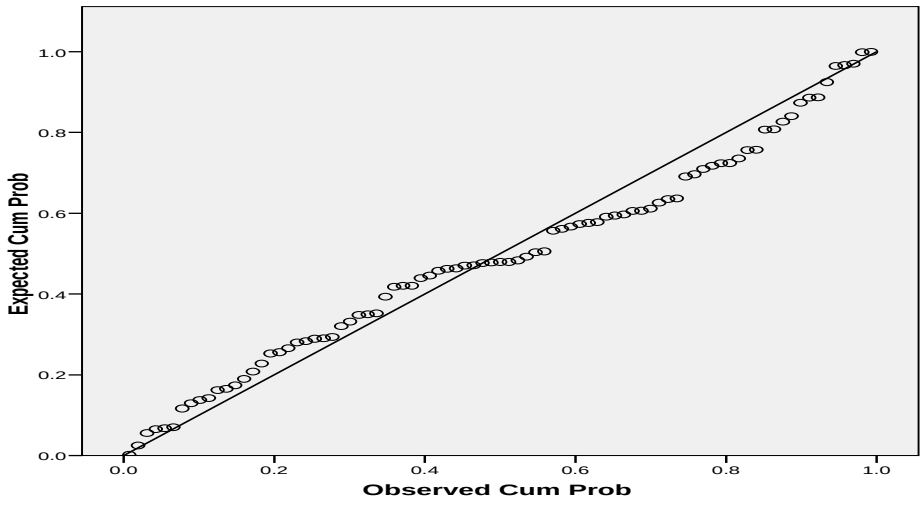


**Figure 10: Graphical Presentation of Explained and Unexplained Variance in the Dependent Variable, Effectiveness of the PAES, as Perceived by DAs**

Source: Survey Data (2009)

In the two data sets, as the t statistics and the significance values show, the multiple correlation coefficients were significantly ($p < 0.05$) different from zero. Therefore, the null hypothesis that was formulated as '*Ho: the multiple correlation coefficient (R) is zero'* is rejected in favour of the research hypothesis which states values for R different from zero.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## Introduction

This chapter presents a summary of the study and draws conclusions from the study. Recommendations have also been put forward for actions and future research works.

## Summary

In Ethiopia, like in many countries in Africa, agriculture is the dominant economic sector. This sector accounts for 60 percent of the GDP and 90 percent of the foreign currency exchange of the country. Besides, the industrial and service sectors of the country depend largely on the agricultural sector for their raw materials. However, as in many other sub-Sahara African countries, agricultural production and productivity in Ethiopia is very low (Anandajayasekeram, *et al.*, 2008; Hailu & Regassa, 2007; World Bank, 2000). Ethiopian agriculture is based on subsistent farm households whose modes of life and operations have remained unchanged for centuries; and as a result of which, high proportion of farm households are unable to feed their families and frequently depend on food aids.

In Ethiopia, food insecurity is a perennial problem. This being recognized by the various governments who assumed power since the 1930's,

PAES has been entrusted to make a difference in the food situation and productivity level of agriculture. However, a more than seventy years of PAES provision-experience with different coverage and intensity shows that the agricultural productivity level is still abysmally low and could not satisfy the food demand of the growing population of the country. The poor performance of the agricultural sector and the food insecurity situation of the country is largely attributed to the extension system (Anandajayasekeram, *et al*., 2008; Kassa, 2003; Tessema, 2000: Gebremedhin, Hoekstra & Tegegne, 2006).

Globally, there are a number of studies that indicate the ineffectiveness of PAES in a number of parameters including relevance of extension packages to the diversified groups of farmers; extent of participation of farmers and development agents in extension programme planning and delivery; professional and technical competences of development agents; and the level of other institutional support to extension. To overcome those problems attributed to PAES provision, several policy directions have been taken worldwide that can basically be grouped into one or more of the following five dimensions: revitalizing of the existing PAES itself, institutional pluralism, decentralization, privatization and demand driven agricultural extension.

The current study was undertaken to find out farmers and development agents' perceived effectiveness of the PAES. To carry out the study, objectives were set in line with:

- examining extension induced characteristics of farmers;
- examining participation of development agents in the PAES;
- examining professional and technical competences of DAs;
- examining availability of support systems to the PAES;

- determining perceived effectiveness level of the PAES;
- determining the relationship between perceived effectiveness levels of the PAES and the independent variables;
- finding out if there were differences in perceived effectiveness levels of the PAES among farmers; and
- establishing best predictors of effective extension service.

In the study, 'effectiveness of the PAES' was the dependent variable. On the other hand, farmers' given and extension-induced characteristics; DAs' professional and technical competences; DAs' participation in extension; and levels of support systems to the PAES were the independent variables. To address the objectives set, relevant research questions and hypotheses were formulated. The hypotheses formulated were:

- $H_1$: Farmers' level of participation in extension has a direct relationship with their rating on effectiveness of the PAES.
- $H_1$: There is a difference in rating on professional competence of development agents between farmers and DAs themselves.
- $H_1$: There is a relationship between level of relevance of extension packages and effectiveness of the PAES as perceived by farmers and DAs.
- $H_1$: Male farmers' rating on the effectiveness of the PAES is higher than female farmers' rating.
- $H_1$: There is a difference in ratings on the effectiveness of the PAES among farmers of the three wealth categories.
- $H_1$: There is a difference in ratings on the effectiveness of the PAES between illiterate and literate groups of farmers.

- $H_1$: There is a difference in ratings on the effectiveness of the PAES among farmers of the three sub-locations.
- $H_1$: There is a difference in rating on the effectiveness of the PAES between farmers and DAs.
- $H_1$: the multiple correlation coefficients (Rs) are different from zero in both the farmers' and DAs' responses.

The research work was a quantitative survey with a correlation design; it was conducted in Soddo-zuria *Woreda*, Wolaita Zone of Southern Nations, Nationalities and Peoples' Regional State (SNNPRS) from September to December 2009. The subjects of the study were 225 farmers (177 males and 48 females) and 85 development agents. To collect data two sets of pretested questionnaires translated into Amharic (Official language of Ethiopia) were used. Data were analysed using SPSS Version 15.

In presenting the findings of the study, it was found necessary to present general background information on farmers' sex and age compositions and educational and wealth statuses as those elements were used in disaggregating findings of the various variables of the study. Accordingly, 177 and 48 were male and female farmers, respectively. The mean age of farmers was 42 years with a standard deviation of 9.4. Regarding educational status, 149 (66.2%) had some form of education from read/write level to Grade 12. The rest 76 (33.8%) farmers were unable to read/write. For male farmers, the highest level of education fall in the category of 'Grade 5-8' followed by the category 'Unable to read and write'; but for female farmers, the reverse of this order was true. A test of independence also showed a significant educational

difference between the male and female farmers ($p < 0.05$). On the average, female farmers were less educated than male farmers.

With respect to wealth status, respondent farmers were grouped into categories of 'Poor' and 'Better-off'. Accordingly, 107 (47.6%) were poor and 118 (52.4%) were better-off. As a Chi-square test showed, the female farmers were significantly poorer than the male farmers ($p < 0.05$). With respect to the development agents, sex composition was important background information as it helps to answer some of the *why* questions in a latter section. Out of the 85 development agents, 67 (78.8%) were male. Next to this background information, the findings have been summarized in line with the objectives of the research work.

## Extension-induced Characteristics of Farmers

Extension induced characteristics of farmers included as variables in the study were: farmers' frequency of contact with development agents, motivation, satisfaction, empowerment, and participation in the PAES. The mean values of those variables on a Likert-type scale of 0 to 4 (0 = none and 4 = very high) were 2.40, 2.31, 2.37, 1.11, and 1.91, respectively. Farmers' participation level in the PAES was also assessed from DAs' perspective in addition to farmers' own response and it was found to be 2.50. The mean values of these five variables range from very low to low on the scale. Besides, for the female farmers the mean values of all the five variables were significantly lower than the mean values of the male farmers ($p < 0.05$). This indicates that female farmers make less frequent contact with development

agents, are less motivated, satisfied, and empowered by the PAES, and have low level of participation in the PAES compared to their male counterparts.

## Participation of Development Agents in the PAES

The mean participation level of DAs in the PAES was 2.62 with a standard deviation of 0.42. DAs' participation was particularly low in selecting extension methods and contents, identifying appropriate educational activities and evaluating outcomes of implemented extension programmes – eventually contributing to their low mean participation value.

## DAs' Professional and Technical Competences

DAs' professional and technical competences were assessed both by the DAs themselves and farmers. The mean professional competence values as perceived by farmers and the DAs' themselves were 2.26 and 2.99, respectively. On the other hand, the mean technical values as perceived by farmers and DAs' were 2.77 and 3.01, respectively. For both the professional and technical competences, the mean values of farmers and DAs were significantly different ($p < 0.05$) implying that DAs have somehow inflated their self assessments. This finding addresses the hypothesis that was formulated as *'$H_0$: There is no difference in rating on professional competence of development agents between farmers and DAs themselves'*. The statistical decision was in favour of the alternative hypothesis that claims differences. Besides, the female farmers' perceived mean professional and technical competency levels were significantly lower than the male farmers' mean values ($p < 0.05$). This could be due to the fact that the male dominated

development agents might not adequately demonstrated their professional and technical competencies to the female farmers who have also significantly lower frequency of contact with DAs.

## Support Systems to the PAES

Support systems to the PAES included in the study were: relevance of extension packages; timely availability of extension packages; adequacy of available extension packages; credit facility; availability of markets for agricultural produces; policy; research; and subject matter specialists. With the exception of the last three support areas, data were collected from both farmers and DAs. But, on the last three variables, data were collected only from DAs as these areas of support were beyond the proper cognitive level of farmers.

Mean relevance levels of extension packages as perceived by farmers and DAs were 2.14 and 2.23, respectively. These two mean values are not statistically different implying that both categories of respondents perceived that relevance levels of extension packages presented to farmers were low. There was, however, statistically significant difference between the male and female farmers' perceived mean values signifying that relevance levels of extension packages were adversely low for the female farmers. Mean values of timely availability and adequacy of extension packages also fall in the low category of the scale for both the farmers and the DAs. There were not also significant differences between the farmers' and DAs' responses, and the male and female farmers' responses. This indicates that the need for timely

availability and adequacy of extension packages was felt in the same manner by both the farmers (male and female) and DAs.

Regarding credit availability, about 66 percent of the farmers and 80 percent of the DAs responded that credit was available for farmers. With respect to adequacy of the available credit, the mean responses of farmers and DAs were 2.36 and 2.19, respectively. These mean values fall in the low category of the scale, and they were not statistically significant ($p > 0.05$); the mean responses of male (2.37) and female (2.33) farmers were not either statistically significant. So, credit adequacy level was uniformly understood by both the farmers (male and female) and DAs as low.

On availability of markets for agricultural produces the mean responses of farmers and DAs were 3.17 and 3.07, respectively. These mean responses fall in the 'high' category of the scale; and the mean difference was not statistically significant ($p > 0.05$). On the other hand, the mean values of male and female farmers were 3.21 and 2.99, respectively; and the mean difference was statistically significant ($p < 0.05$). These findings indicate that, on the average, availability of market for agricultural produces is high both from the perspective of farmers and DAs, but the marketing opportunity for female farmers is relatively lower than the marketing opportunity for male farmers.

Levels of policy, research and subject matter specialists' support, as indicated earlier, were assessed only from the perspectives of DAs. The mean responses on these three variables were 2.02, 2.34 and 2.25, respectively. All the three mean values fall in the 'low' category of the scale. Regarding to policy matters, support levels by regional and/or federal institutions (for

instance, on allocating DAs and establishing farmers' training centres) were relatively better than support levels required from the *Woreda* offices (for example, on availing transport facilities for DAs, creating experience-sharing opportunities for farmers and DAs).

Regarding research and SMSs, in general, support levels in the areas of crop production and management were better than the support levels in the areas of farm implements and animal production and management. This necessitates that the PAES needs to do more in coordinating and following more of a holistic approach in its endeavours.

## Respondents' Perceived Effectiveness Levels of the PAES

Determining farmers' and DAs' perceived effectiveness level of the PAES was one of the research objectives. In line with this objective, a hypothesis *'$H_0$: There is no difference in rating on the effectiveness of the PAES between farmers and DAs'* was also formulated in the study. Mean perceived effectiveness levels of farmers' and DAs' were 2.39 and 2.73, respectively. The two mean values indicate that both farmers and DAs agree on the low effectiveness level of the PAES. However, in terms of the magnitude of the two figures, farmers' perceived effectiveness level of the PAES was statistically lower than DAs' perceived effectiveness level ($p < 0.05$). So, the null hypothesis was rejected.

Differences in perceived effectiveness levels of the PAES among different sub-groups of farmers was also assessed using sex, age, educational status, wealth status and location of farmers as grouping variables.

Accordingly independent t-tests and ANOVA were carried out to see differences between and among groups.

Independent t-tests showed that responses on effectiveness of the PAES were dependent on sex and educational statuses of the respondent farmers. Female farmers and farmers who were unable to read/write rated significantly lower than male and literate farmers on effectiveness of the PAES ($p < 0.05$). So, the null hypotheses that *'there is no difference in ratings on the effectiveness of the PAES between male and female farmers'* and *'there is no difference in ratings on the effectiveness of the PAES between illiterate and literate groups of farmers'* were rejected. On the other hand, a t-test of mean difference attributed to age was not statistically significant ($p > 0.05$).

ANOVA tests were conducted on wealth status and location of farmers. Both of these variables were having three categories. Statistically significant difference ($p < 0.05$) was observed among farmers of the three different wealth groups, i.e., poor, medium and better off on ratings of effectiveness of the PAES. Thus, the null hypothesis that *'there is no difference in rating on effectiveness of the PAES among farmers of the three wealth categories* was rejected. However, the mean differences on effectiveness of the PAES across farmers of the three different locations were not statistically significant ($p > 0.05$). So, the study failed to reject the null hypothesis that *'there is no difference in ratings on the effectiveness of the PAES among farmers of the three sub-locations'*. Location of farmers had no any significant contribution in variations of ratings on effectiveness of the PAES.

Relationship between Perceived Effectiveness Levels of the PAES and the Independent Variables

Davis' (1971) definitions of magnitudes of associations were used to explain relationships between the variables of the study. From farmers' perspectives, the independent variables that had moderate to very strong associations with the dependent variable, effectiveness of the PAES, were sex of the farmer (r = 0.48), educational level of the farmer (0.68), wealth status of the farmer (0.50), frequency of farmer's contact with DAs (0.37), motivation (0.67), satisfaction (0.62) farmer's participation in extension (0.78), DAs' professional competence (0.53), DAs' technical competence (0.36), and relevance of extension packages (0.79).

From DAs' responses, independent variables that had moderate to very strong association with effectiveness of the PAES were farmers' participation in extension (0.83), relevance of extension packages (0.84), age of DAs (0.47), years of service as DA (0.51), DAs' participation in extension (0.69), research support to the PAES (0.51) and SMSs support to the PAES (0.79). In both the farmers' and DAs' data sets relevance of extension packages and farmers' participation in extension were commonly felt to be associated with effectiveness of the PAES and their degree of associations were also very strong.

From the two data sets, the two hypotheses that were formulated in line with relationships such as *'$H_0$: Farmers' level of participation in extension does not have relationship with their rating on effectiveness of the PAES'* and *'$H_0$: There is no relationship between level of relevance of extension packages and effectiveness of the PAES as perceived by farmers and DAs'* were rejected

at the 0.05 alpha level as the correlations between the variables were significant.

Establishing Best Predictors of Effective Extension Service

Establishing best predictors of effective extension service was the last objective of the study. Accordingly, from both the farmers and DAs' perspectives best predictors were established.

From farmers' perspective relevance of extension packages; farmers' participation in extension; farmers' motivation by extension; educational status of farmers; wealth status of farmers; sex of farmers; development agents' professional competence; and farmers' satisfaction with extension were found to be important predictors of effectiveness of the PAES. These eight variables explained about 84 percent of the variance ($R^2$, the coefficient of multiple determination was 0.836) in the dependent variable, effectiveness of the PAES.

From DAs' perspective, on the other hand, relevance of extension packages; farmers' participation in extension; research support to extension; subject matter specialists' support to extension; and development agents' participation in extension were the important predictors of the dependent variable, effectiveness of the PAES. From DAs' perspectives, $R^2$ was 0.879. So, this model explains about 88 percent of the variance in the dependent variable, effectiveness of the PAES.

From both the farmers and DAs' responses, the multiple correlation coefficients were significantly different from zero. Thus, the hypothesis '$H_0$:

*the multiple correlation coefficient (R) is zero'* was rejected in favour of the research hypothesis that claims R different from zero.

## Conclusions

The study showed that effectiveness of the PAES was low in terms of the various variables investigated. The following are specific conclusions drawn from the study:

1. The observed low extension-induced characteristics of farmers could be due to interplay of low levels of DAs' professional and technical competencies in working with farmers and low levels of availability of relevant extension packages.
2. There was a gender disparity in the responses of farmers on all the extension-induced variables. On the average, female farmers' ratings were lower than their male counterparts'. This could be due to i) the predominantly male DAs who might not serve well the interests of female farmers, ii) resource limitation of female farmers to experiment new approaches, and iii) low level of education of the female farmers that might have impeded their capacity to seek for information and other extension supports.
3. DAs' participation in the PAES was low. This could be due to i) the PAES itself which promotes extension packages in a linearly top-down fashion, ii) the low professional level of the DAs which was witnessed by the DAs' self assessment and the farmers' responses, and iii) the low levels of policy, and subject matters' support to the PAES that may create a necessity for enhanced DAs' participation in the PAES.

4. Farmers' ratings on DAs' professional and technical competences were low. However, DAs' own rating was low only on their professional competency- on the technical competency their rating was high. In addition, farmers' ratings on both competency levels were significantly lower than DAs' own responses implying the necessity of source triangulation in seeking information for policy decisions.
5. In both farmers and DAs' responses ratings on DAs' technical competencies were higher than ratings on professional competencies implying that achieving professional competence is more difficult than achieving technical competence. Meaning, for DAs to be professionally competent they need to internalize the profession of extension and develop their affective domain through time. On the other hand, in the case of technical competencies, with comparatively less effort and guidance, DAs may acquire the necessary skills.
6. With the exception of market availability for agricultural produces where both farmers and DAs perceived high opportunity, the mean values for the other support system-variables to the PAES were below average.
7. In general, farmers and DAs' perceived effectiveness levels of the PAES were low. However, the mean value of farmers was significantly lower than that of DAs. Besides, perceived effectiveness levels of female farmers, uneducated farmers and poor farmers were significantly lower than male farmers, educated farmers and relatively better off farmers in terms of wealth status, respectively. This finding indicates the importance of target-stratification in extension

programme development and delivery systems so as to help marginalized extension clienteles.

8. From farmers' responses, relevance level of extension packages, participation level in extension, motivation level by extension, educational status, wealth status, sex, DAs' professional competence, and satisfaction level with extension were important predictors of effectiveness of the PAES. On the other hand, from DAs' responses, the important predictors were relevance level of extension packages, farmers' participation level in extension, levels of research and SMS supports, and DAs' levels of participation in extension.

The overall policy implication of the findings of the study is that the Bureau of Soddo-zuria *Woreda*, in collaboration with other critically relevant stakeholders, needs to make necessary structural, organizational, managerial, and methodological changes to make the PAES more effective and client-oriented.

## Recommendations

1. The PAES need to make a concerted effort in enhancing farmers' motivation, satisfaction and empowerment levels through proactive need identification and enhancing farmers' participation in extension programme development and delivery processes.
2. The PAES need to create better opportunities in enhancing farmers' contact with DAs through boosting DAs' professional and technical

competences and developing farmers' trust of DAs' importance in changing their situations

3. The Soddo-zuria *Woreda* in collaboration with Wolaita, Hawassa, and Arbaminch universities should make comprehensive needs assessment for training of DAs to improve their professional and technical competencies.
4. The Bureau of Agriculture and Rural Development of Soddo-zuria *Woreda,* in collaboration with other stakeholders, need to enhance DAs' participation in extension through creating a favourable policy environment.
5. The Bureau of Agriculture and Rural Development of Soddo-zuria *Woreda,* in collaboration with the regional and federal Bureaus of Agriculture and Rural Development, should design pro-poor agricultural development strategies, run literacy programmes alongside, and mainstream gender into the routine extension activities.
6. The Bureau of Agriculture and Rural Development of Soddo-zuria *Woreda,* in collaboration with other stakeholders in the administrative hierarchy, should recruit and assign more female DAs to address better the extension needs of female farmers.
7. The Bureau of Soddo-zuria *Woreda* needs to guarantee farmers' access to relevant agricultural technologies by enhancing farmers and DAs' participation in extension and creating a functional link between the PAES, and research institutes and SMSs.
8. In order to ease the burden on the PAES and to better empower farmers, the *Woreda* Bureau of Agriculture and Rural Development

should initiate and organize ‘collective action-groups of farmers’ who can facilitate acquisition of farm inputs, credits and other agricultural packages, access distant markets, strengthen farmers’ research and extension groups, facilitate mutual learning among farmers, and fulfil other functions related to benefits of economy of scale and interactions of peer-groups.

## Suggestions for Future Research

The following are suggested for further study.

1. Assessing role of Farmers’ Research and Extension Groups in Wolaita Zone in relation to enhancing farmers’ participation in the PAES
2. Assessing adequacy of the curricula of the Technical and Vocational Training Colleges in addressing professional and technical competencies of development agents in SNNPRS
3. Assessing roles and impacts of Farmers’ Training Centres in addressing farmers’ training needs in Wolaita Zone

## REFERENCES


Adams, M.E. (1982). *Agricultural extension in developing countries*. Essex: Longman.

Adesiji, G.B., Akinsorotan, A.O., & Omokore, D.F. (2010). Farmers' assessment of extension services in Ogun State, Nigeria. *Journal of Agricultural and Food Information, 11*(2), 143-156.

Agbamu, J.U. (2000). Agricultural research-extension linkage systems: An international perspective. *Agricultural Research and Extension Network, Paper N0. 106a,* 1-7.

Alex, G., Byerlee, D., Helene-Collion, M., & Rivera, W. (April 2004). Extension and rural development: Converging views on institutional approaches. *Agriculture and Rural Development Discussion Paper 4.* Washington DC.: World Bank.

Allen, W., Kilvington, M., Nixon, C., & Yeabsley, J. (2002). Sustainable development extension. *MAF Technical Paper N0. 2002/03*. Retrieved on 15 April 2009, from http://www.maf.govt.nz/mafnet/rural-nz/people-and-their-issues/education/sustainable-development

Anandajayasekeram, P., Davis, K.E., & Workneh, S. (2007). Farmer field schools: An alternative to existing extension systems? Experience from Eastern and Southern Africa. *Journal of International Agricultural and Extension Education, Vol. 14*(1): 81-93.

Anandajayasekeram, P., Dijkman. J., & Hoekstra, D. (2005). *Past, present and future of extension services*. Paper presented at Extension Training Workshop Organized by the Improving Productivity and Market

Success (IPMS) of Ethiopian Farmers project, May 23–25, 2005. ILRI (International Livestock Research Institute), Addis Ababa, Ethiopia.

Anandajayasekeram P, Puskur R, Workneh, S., & Hoekstra D. (2008). *Concepts and practices in agricultural extension in developing countries: A source book.* Nairobi: IFPRI and ILRI.

Anderson, J.R., & Feder, G. (2004). Agricultural extension: Good intensions and hard realities. *The World Bank Research Observer, 19*(1), 41-60.

Annor-Frempong, F., Kwarteng, J., Agunga, R., & Zinnah, M.M. (2006). Challenges of infusing information and communication technologies in extension for agricultural and rural development in Ghana. *Journal of Extension, 22* (December), 69-82. Retrieved on 22 June 2009, from http://www.jesonline.org/2006Dec.htm#Annor

Apantaku, S.O., Oloruntoba, A., & Fakoya, E.O. (2003). Farmers' involvement in agricultural problems identification and prioritization in Ogun State, Nigeria. *South African Journal of Agricultural Extension, Vol. 32*, 45-59.

Aphunu, A., & Otoikhian, C.S.O. (2008). Farmers' perception of the effectiveness of extension agents of Delta State Agricultural Development Programme (DADP). *African Journal of General Agriculture, 4*(3), 165-169.

Arega, D. A., & Rashid, M. H. (2003). *Measuring the impact of Ethiopia's new extension programme on the productive efficiency of farmers.* Paper presented at the 25th International Conference of Agricultural Economists, August 16-22, 2003, Durban, South Africa.

ASARECA, Association for Strengthening Agricultural Research in Easter and Central Africa (2009). "Workshop report on Capacity needs for strengthening and empowering farmer organizations in East and Central Africa", Workshop held at Imperial Resort Beach Hotel, 2-7 February, 2009, Entebbe.

Bagamba, F. (2007). *Market access and agricultural production: The case of banana production in Uganda* (Unpublished Doctoral Thesis). Wageningen University, The Netherlands.

Baltissen, G., Wabwile, E., Kooijman, M., & Defoer, T. (2000). Facilitating learning processes in agricultural extension: Lessons from Western Kenya. *IIED Series on Managing Africa's Soils*, N0. 20.

Baryeh, A.B., Ntifo-Siaw E., & Baryeh, E.A. (2000). Assessment of cassava processing technology by women in Ghana. *Journal of Extension Systems, 16(*1) *1-22,* Retrieved on 22 June 2009, from http://www.jesonline.org/2000jun.htm

Baxter, M. (1989). New developments in agricultural extension. In N. Roberts, (Ed.), *Agricultural extension in Africa* (pp. 96-105), Washington D.C.: World Bank.

Belloncle, G. (1989). "Proposal for a new approach to extension services in Africa". In N. Roberts (Ed.), *Agricultural extension in Africa*. (pp. 45-52 ) Washington D.C.: World Bank.

Bennett, C.F. (1976). *Analyzing impacts of extension programs* (No. ESC 575). Washington D.C.: U.S. Department of Agriculture Extension Service.

Berhanu, A. (2008). Matching extension service with farmers needs: Towards combining social and agro-ecological approaches in Ethiopian extension. *Eastern Africa Social Science Research Review, 25*(2), 1-25.

Bie, S.W. (1997). Preface. In B.E., Swanson, R.B., Bentz & A.J., Sofranko (Eds), *Improving agricultural extension: A Reference manual* (p. v). Rome: FAO.

Black, A.W. (1976). *Organizational genesis and development: A study of Australian agricultural colleges.* St. Lucia: University of Queensland Press.

Blackburn, D.J. (1989). Preface. In D.J. Blackburn (Ed.), *Foundations and changing practices in extension (xii-xiii).* Ontario/Guelph: University of Guelph.

Blackburn, D.J. & Vist, D.L. (1984). Historical roots and philosophy of extension. In D.J. Blackburn (Ed.), *Extension handbook* (pp. 1-10). Ontario/Guelph: University of Guelph.

BoARD, Bureau of Agriculture and Rural Development, (2007). *Guideline on participatory extension and delivery system:* Working paper. Awassa: Author

Boone, E.J. (1989). Philosophical foundations of extension. In D.J. Blackburn (Ed.), *Foundations and changing practices in extension (*pp. 1-9). Ontario/Guelph: University of Guelph.

Borlaug, N.E. (2004). Feeding a world of 10 billion people: our 21st century challenge. In C.G. Scanes & J.A. Miranowski (Eds.), *Perspective in world food and agriculture,* (pp. 31-35). Iowa: Iowa State Press.

Boyle, J.E. (1921). Marketing agricultural products. *The American Economic Review, 11*(2), 207-213.

Bradfield, D.J. (1966). *Guide to extension training*. Rome: FAO

Bray, F. (1984). *Joseph Needham's science and civilization in China: Biology and biological technology*. Cambridge: Cambridge University Press

Brunner, E., Hsin, E. & Yang, P. (1950). Rural America and the extension service. *The Annals of the American Academy of Political and Social Science on line, 268*: 245-246; Retrieved on 11 April 2009, from http://ann.sagepub.com/cgi/reprint/268/1/245-246

Bryman, A. & Cramer, D. (2005). *Quantitative data analysis with SPSS 12 and 13*. London and New York: Routledge, Taylor and Francis Group.

Chamala, S. (1990). Establishing a group: A participative action model: In S. Chamala and P.D. Mortiss (Eds), *Working together for land care: Group management skills and strategies* (pp. 368-368). Brisbane: Australian Academic Press.

Campbell, D.A.C. (1999). Managing public sector extension organizations: Some critical issues. *Journal of International Agricultural and Extension Education, 6*(2), 55-59.

Chamberlin, J. (2008). *A Working Definition of Empowerment*. Retrieved on 21 April 2008 from http://www.power2u.org/

Chambers, R., Pacey, A. & Thrupp, L.A. (1989). *Farmer first: Farmer innovation and agricultural research.* London: Intermediate Technology Publications

Cohen, L. & Manion, L. (1980). *Research methods in education*. London: Croom Helm Ltd.

Collion, M.H. (2004). Introduction to revitalization within public sector services. In W.M., Rivera, and G. Alex (Eds.), *Decentralized systems: Agriculture and Rural Development Discussion Paper 11 Extension Reform for Rural Development*, (pp. 1-5). New York: World Bank.

Commonwealth Secretariat (2001). *Gender mainstreaming in agriculture and rural development: A reference manual for governments and other stakeholders*. London: Marlborough House.

Croppenstedt, A. & Muller, C. (2000). The impact of health and nutritional status of farmers on their productivity and efficiency: Evidence from Ethiopia. *Economic Development and Cultural Change, 48*(3), 475-502.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of the tests. *Psychometrika, 16*, 297-334. Retrieved on 10 July 2009 from http://www.springerlink.com/content/n435u12541475367/?p=a5a72f3bb9704c3b99440651c88a358a&pi=2

CSA (1998). *The Population and housing census of Ethiopia. Results at country level analytical report*. Addis Ababa: CSA.

Davidson, A.P. & Ahmad, M. (2002). Effectiveness of public and private sector agricultural extension: Implications for privatization in Pakistan. *The Journal of Agricultural Education and Extension, 8*(3), 117-126.

Davis, J.A. (1971). *Elementary Survey Analysis.* Englewood Cliffs/NJ: Prentice-Hall.

Delman, J. (1991). *Agricultural extension in renshou county, China: A case study of bureaucratic intervention for agricultural innovation and change* (Unpublished Doctoral Thesis). University of Aarhus, Denmark.

Deshler, D. (1997). Evaluating extension programmes. In B.E. Swanson, R.P. Bentz, & A.J. Sofranko (Eds.), *Improving agricultural extension: A reference manual* (93-104). Rome: FAO.

Dulle, F.W. (2000). The extension triad approach in disseminating agricultural information to extension workers: Some experiences from the southern highlands dairy development project, Tanzania. *Journal of Information Science, 48*(2), 121-128.

Environmentally and Socially Sustainable Development Network (ESSDN) (1995). Participation in agricultural extension. *Social Development Notes N0. 11*

FAO (2005). *Agricultural extension and training needs of farmers in the small island countries: A case study from Samoa*. Rome: FAO

FAO (1985). *Guide to extension training*. Rome: FAO

FAO & World Bank (2000). *Agricultural knowledge and information systems for rural development: Strategic vision and guiding principles*. Rome: FAO & World Bank.

Farrington, J. (Nov. 1994). Public sector agricultural extension: Is there life after structural adjustment? *ODI Natural Resources Perspectives, N0. 2.* London: Portland House.

Feder, G., Willet, A., & Zijp, W. (2001). Agricultural extension: Generic challenges and ingredients for solutions. In S.Wolf & D. Zilberman (Eds), *Knowledge generation and technical change: Institutional innovation in agriculture* (pp.313-356). Boston: Kluwer Academic Publishers.

Fleischer, G., Waibel, H. & Walter-Echols, G. (2002). Transforming top-down agricultural extension to a participatory system: A study of costs and prospective benefits in Egypt. *Public Administration and Development, 22,* 309-322.

Gebremedhin, B., Hoekstra D., & Tegegne, A. (2006). *Commercialization of Ethiopian agriculture: Extension service from input supplier to knowledge broker and facilitator.* Nairobi: IPMS

Gelb, E., Gal, B., & Wolfson, D. (2009). Information and communication technologies (ICT) for agricultural extension – an overtime Israeli perspective. *Journal of Sustainable Development in Africa, 11* (2), 1-26.

Getahun, A. (1984). Stability and instability of mountain ecosystems in Ethiopia. *Mountain Research and Development, 4*(1), 39-44.

Government of the People's Republic of Bangladesh, (GPRB) (1996). *New agricultural extension policy.* Dhaka: Ministry of Agriculture.

Government of Federal Democratic Republic of Ethiopia, (GFDRE) (1994E.C/2002). *Rural Development Policies, Strategies, and Tactics.* Addis Ababa: Press and Audiovisual Department [Translated from the Amharic Version].

Government of Federal Democratic Republic of Ethiopia, (GFDRE) (December, 2008). *Summary and statistical report of the 2007 population and housing census.* Addis Ababa: Population Census Commision.

Gupta, V. (1999). *SPSS for beginners.* No Place of Publication: VJBOOKS.

Hailu, A. & Regassa, N. (2007). Correlates of household food security in densely populated areas of Southern Ethiopia: Does the household structure matter? *Studies on Home and Community Science 1*(2): 85-91.

Haug, R. (1999). Some leading issues in international agricultural extension, a literature review. *The Journal of Agricultural Education and Extension, 5*(4): 263- 274.

Healey, J.F. (2002). *Statistics: A Tool for social research.* Belmont, CA: Wadsworth/Thomson Learning.

Hegde, N.G. (October 2005). Traditional extension methods in modern agriculture. *Indian Farming Special Issue on World Food Day*. 45-47.

Howell, D.C. (2002). *Statistical methods for psychology*. Belmont, CA: Thomson/Wadsworth.

Institutions for Natural Resource Management (n.d). Participation: A dilemma for extension agents. *Briefing ET 07*. Brighton: University of Sussex/DFID.

Iwuchukwu, J.C., Agwu, A.E., & Igbokwe, E.M. (2008). Incorporating migrant farmers into Nigeria's agricultural extension policy. *Journal of Agricultural Extension, 12*(2) December: 95-107.

Johnson, R.L. (2003). *Rebuild the agricultural research and extension system in Nigeria*. Retrieved on 21 June 2009, from http://www.nigerdeltacongress.com/rarticles/rebuild_the_agricultural_researc.htm

Jones, G.E. (1981). The Origins of agricultural advisory services in the nineteenth century. *Social Biology and Human Affairs, 46*(2), 89-106.

Jones, G.E. & Garforth C. (1997). The History, Development, and Future of Agricultural Extension. In B.E. Swanson, R.B. Bentz, & A.J. Sofranko (Eds), *Improving agricultural extension: A reference manual* (pp. 3-12). Rome: FAO.

Karbasioun, M., Mulder, M., & Biemans, H. (2007a). The supporting role of the agricultural extension service and implications for agricultural extension instructors as perceived by farmers in Esfahan, Iran. *Journal of International Agricultural and Extension Education, 14*(2), 31-44.

Karbasioun, M., Mulder, M., & Biemans, H. (2007b). Towards a job competency profile for agricultural extension instructors: A survey of views of experts. *Human Resource Development International Journal, 10*(2), 141-155.

Kassa, B. (2003). Agricultural extension in Ethiopia: The case of participatory demonstration and training extension system. *Journal of Social Development in Africa, 18*(1), 49 – 83.

Katungi, E., Edmeades, S. & Smale, M. (2008). Gender, social capital and information exchange in rural Uganda. *Journal of International Development, 20*, 35–52.

Kemirembe, O.M., Brewer, F., & Krueger, D. (2007). Perceived needs and barriers of Rwandan rural women to participate in agricultural extension services. *Journal of International Agricultural and Extension Education, 14*(2), 75-75.

Khalil, A.H.O., Ismail, M., Suandi, T., & Silong, A.D. (2008). Extension worker as a leader to farmers: Influence of extension leadership competencies and organizational commitment on extension workers'

performance in Yemen. *The Journal of International Social Research, 1*(4), 358-387.

Khan, M.Z., Nawab, K., & Khan, M.A. (2006). Competence of agricultural extension agents. *Weed Science Society of Pakistan, 12*(4), 331- 337.

Kidd, A.D., Lamers, J.P.A., Ficarelli, P.P., & Hoffmann, V. (2000). Privatizing agricultural extension: Caveat emptor. *Journal of Rural Studies, 16*, 95 – 102.

Kippenberger, T. (1997). A prophet is not without honour, save in his own country: The story of Reginald Revans. *The Antidote, 2*(7), 23-24.

Klerkx, L., Grip de K., & Leeuwis, C. (2006). Hands off but strings attached: The contradictions of policy-induced demand-driven agricultural extension. *Agriculture and Human Values, 23*, 189–204, DOI 10.1007/s10460-005-6106-5.

Knowles, M. S. (1950). *Informal adult education*. Chicago: Association Press.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. New Jersey: Prentice Hall PTR.

Kumba, F.F. (2003). Farmer participation in agricultural research and extension services in Namibia. *Journal of International Agricultural and Extension Education, 10*(3), 47-55.

Kwarteng, J.A., Kuehn, A., Braun, M., & Gerken, A. (2004). Assessment of Participatory Technology Development and Extension (PTD &E) in Ghana. *Journal of Extension Systems, 20*(1), June, 1-17. Retrieved on 21 June 2009 from http://www.jesonline.org/2004jun.htm#kwarteng

Lahai, B.A.N., Goldey, P., & Jones, G.E. (2000). The gender of extension agent and farmers' access to and participation in agricultural extension

in Nigeria. *The Journal of Agricultural Education and Extension, 6*(4), 223-233.

Lamers, J.P.A., Becker, T., & Von Oppen, M., (1996). Arrangements to finance tree windbreaks for wind erosion control. In B. Buerkert, B.E. Allison, & M. Von Oppen (Eds.), *Wind erosion in West Africa: The problem and its control* (pp. 227-241). Weikersheim: Markgraf Verlag.

Landwirtschaftliche Beratungszentrale Lindau, LBL (Swiss Centre for Agriculture Extension) (2003). *The extension butterfly: A model to illustrate the functions of extension in the context of rural development.* Berne: Swiss Agency for Development and Cooperation.

Leeuwis, C. & Van den Ban (2004). *Communication for rural innovation: Rethinking agricultural extension.* London: Blackwell Publishing.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of psychology, N0. 140.* New York: Wiley & Sons, Inc.

Logan, G.N. (1984). *Man and the land in Queensland education 1874 – 1905: Agricultural education as a solution to man-physiographic dissonance in colonist Queensland* (Unpublished M.Ed. thesis). University of Queensland, Australia.

Mattila, T.E.A., Kaustell, K.O., Leppälä J., Hurme, T., & Suutarinen, J. (2007). Farmers' perceptions of necessary management skills in Finland. *The Journal of Agricultural Education and extension, 13*(4), 287-300. Retrieved on 01 December 2007, from http://dx.doi.org/10.1080/13892240701631018

Maunder, A. H. (1972). *Agricultural extension: A reference manual.* Rome: FAO.

McCaslin, N.L. & Tibezinda, J. (1997). Assessing target group needs. In B.E. Swanson, R.P. Bentz & A.J. Sofranko (Eds.), *Improving agricultural extension: A reference manual* (pp. 39-46). Rome: FAO.

Mendesil, E., Abdeta, C., Tesfaye, A., Shumeta, Z., & Jifar, H. (2007). Farmers' perceptions and management practices of insect pests on stored sorghum in South Western Ethiopia. *Crop Protection, 26,* 1817–1825.

Microsoft® Encarta® 2007. ©1993-2006 Microsoft Corporation.

Misra, D.C. (1997). Monitoring extension programmes and resources. In B.E. Swanson, R.B. Bentz & A.J. Sofranko (Eds). *Improving agricultural extension: A reference manual (*pp. 151-160). Rome: FAO.

MoARD, Ministry of Agriculture and Rural Development (1998E.C/2006). *Guideline on agricultural extension in Ethiopia.* Working paper, MoARD [Translated from the Amharic Version].

Mokone, G. & Steyn, G.J. (2005). Evaluation of performance of extension workers in Lesotho. *South African Journal of Agricultural Extension, 34*(2), 275-288.

Monu, E.D. (1982). Correlates of extension contact amongst farmers of Ondo and Oyo States of Nigeria. *Canadian Journal of African Studies, 16*(3), 595-599.

Moris, J.R. (1989). Extension under East African field conditions. In N. Roberts (Ed.), *Agricultural extension in Africa* (pp. 78-88). Washington D.C.: World Bank.

Morris, R.M., Oreszczyn, S.M., Stoate, C. & Lane, A.B. (2002). Farmers' attitudes, perceptions, and the management of field boundary vegetation

on farmland. *British Grassland Society. Occasional Symposium N0. 36*, 105 – 110.

Nagel, U. J. (1997). Alternative approaches to organizing extension. In B.E. Swanson, R.B. Bentz & A.J. Sofranko (Eds), *Improving agricultural extension: A reference manual* (pp. 13-20). Rome: FAO.

Navaratnam, K.K. (1985). *Social competence and in-service training needs of village level extension agents in Sri Lanka*. Paper presented at Scholars Forum on International Development, May 17, 1985, Blacksburg, VA.

Neuchatèl Group (1999). *Common framework on agricultural extension*. Paris: Neuchatèl Group.

Neuchatèl Group (2004). *Farmer empowerment: Experiences, lessons learned and ways toward.* Case presentation at Neuchatèl Initiative Annual Meeting, 1-4 November 2004, Aarhus, Denmark.

Ngomane, T. (2004). The evolution of extension processes and practices in relation to smallholder farming in Southern Africa. *Proceedings of the 4th International Crop Science Congress*, 26 Sep – 1 Oct 2004, Brisbane, Australia. Published on CDROM. Web site www.cropscience.org.au

Nwachukwu, E.O. (2005). Gender sensitivity in agricultural extension services in Imo State: Issues and challenges. *Global Approaches to Extension Practices, 1*(1), 83-90.

ODI (May 2002). Creating policy environment for pro-poor agricultural extension: the Who? What? And How? *Natural Resource Perspectives, Number 80.* London: ODI.

Okorley, E.L., Gray, D., & Reid, J. (2008). Improving group-based extension approaches in a decentralized agricultural extension context: Key considerations from a Ghanaian case study. *Journal of Extension Systems, 24*(2). Retrieved on 21 June 2009 from http://www.jesonline.org/2008dec.htm#okorle

Okorley, E.L., Kwarteng, J.A., & Annor-Frempong, F.K. (2002). Extension contact and professional competencies needed by extension agents in the Central Region of Ghana for effective transfer of fish-processing technologies to small-scale women in fish processing. *Ghana Journal of Agricultural Science, 35*, 153-161.

Oladosu, I. O. (2006). Implications of farmers' attitude towards extension agents on future extension programme planning in Oyo State of Nigeria. *Journal of Social Sciences, 12*(2), 115-118.

Oladosu, I. O., & Okunade, E. O. (2006). Perception of village extension agents in disseminating agricultural information in Oyo Agricultural Zone of Oyo-State. *Journal of Social Sciences 12*(3), 187-191.

Onwuegbuzie, A.J. & Leech, N.L. (2006). Linking research questions to mixed method data analysis procedures. *The Qualitative Report, 11*(3), September 2006, 474-498.

O'Reilly, D. (1999). In conversation with Donald Schon. In D. O'Reilly, L., Curnningham, & S. Lester (Eds.), *Developing the capable practitioner*. London: Taylor & Francis Ltd. Retrieved on 17 June 2009 from http://www.heacademy.ac.uk/

Percy, R. (1999). Gender analysis and participatory rural appraisal: Assessing the current debate through an Ethiopian case study involving

agricultural extension work. *International Journal of Educational Development 19,* 395–408.

Plucknett, D.L. (2004). Africa: Sasakawa Global 2000 extension efforts in Africa. In W.M. Rivera and G. Alex (Eds.), *Volume 4. Revitalization within public sector services: Case studies of international initiatives* (pp. 34-42). Agriculture and Rural Development Discussion Paper 11 Extension Reform for Rural Development. New York: World Bank.

Plüss, L., Scheidegger, U., Katz, E., & Thönnissen, C. (2008). Understanding the research-extension interface: Capitalizing experiences of nine agricultural projects in East Africa. *Rural Development News*, 40-46.

Qamar, M. K. (2005). *Modernizing national agricultural extension systems: A practical guide for policy-makers of developing countries*. Rome: FAO

Revans, R.W. (1988). *The ABC of action learning: Empowering managers to act and learn from action.* London: Lemos and Crane.

Revans, R.W. (1982). *The origin and growth of action learning*.: Chartwell Bratt.

Revans, R.W. (1969). *The enterprise as a learning system*. Bromley: Chartwell Bratt.

Richardson, D. (2003). *Agricultural Extension Transforming ICTs: Championing Universal Access.* Background paper for CTA's ICT Observatory 2003. Guelph, Ontario, Canada.

Rivera, W. M. (Summer 2008). The business of the public sector: Extension in transition and the balance of powers. *Journal of International Agricultural and Extension Education, 15*(2), 19-32.

Rivera, W.M. (2007). Innovation and beyond tensions in the family of reform. *Journal of Extension Systems, 23*(2), Dec., 91-102. Retrieved on 21 June 2009 from http://www.jesonline.org/2007Dec.htm

Rivera, W.M. (1997). Agricultural extension into the next decade. *European Journal of Agricultural Education and Extension, 4*(1), 29-38.

Rivera, W.M. (1996). Agricultural extension in transition worldwide: structural, financial and managerial strategies for improving agricultural extension. *Public Administration and Development, 16*, 151-161.

Rivera, W.M. & Alex, G. (2004). Executive summary. In: W.M. Rivera & G. Alex (Eds.), *Volume 1. Decentralized systems: Agriculture and Rural Development Discussion Paper 8 Extension Reform for Rural Development* (pp. ix – xvii). New York: World Bank.

Rivera, W.M. & Gustafson, D.J. (Eds.) (1991). *Agricultural extension: Worldwide institutional evolution and forces for change.* Amsterdam: Elsevier.

Rivera, W.M., Qamar, M.K. & Van Crowder, L. (2001). *Agricultural and rural extension Worldwide: Options for institutional reform in developing countries.* Rome: FAO.

Röling, N. (1988). *Extension Science: Information Systems in Agricultural Development.* Cambridge, UK: Cambridge University Press.

Rural Industries Research and Development Corporation, RIRDC (2003). *Agricultural extension, learning and change: a report for the Rural Industries Research and Development Corporation*. Publication N0. 03/032. Australia: Canberra.

Sadighi, H. & Mohammadzadeh, G. (2002). Extension professional staffs' attitude toward participatory approach of extension activities and rural development. *Journal of International Agricultural and Extension Education, 9*(2), 7-14.

Saito, K. A., & Weidemann, C. J. (1990). *Women Farmers in Africa.* 103 World Bank Discussion Paper. Washington DC.: The International Bank for Reconstruction and Development.

Sarker, M.A. & Itohara, Y. (2009). Farmers' perception about the extension services and extension workers: The case of organic agriculture extension programme by PROSHIKA. *American Journal of Agriculture and Biological Sciences, 4*(4), 332-337.

Saville, A. H. (1965). *Extension in Rural Communities: A Manual for Agricultural and Home Extension Technician Workers*. London: Oxford University Press.

Schilling, K. (2000, May 12). Assessment questions and first-year job description. *First-Year Assessment Listserv (FYA) Series*. Retrieved on 15 March 2008, from http://www.Brevard/fyc/listserv/remarks/schilling600.htm

Schön, D. A. (1983). *The reflective practitioner. How professionals think in action.* London: Temple Smith.

Schwass, R.H. (1983). Problems of agricultural extension and development in the South Pacific. *A technical bulletin of Food & Fertilizer Technology Centre for the Asian and Pacific Region*. Retrieved on 22 April 2009, from http://www.agnet.org/library/eb/200b/

Shadish, W. R. Jn., Cook, T. D. & Leviton, L.C. (1991). *Foundations of programme evaluation: Theories of practice.* London and New Delhi: SAGE Publications.

Shamebo, D. & Belehu, T. (1999). Peasants' participatory evaluation in release of early maturing sweet potato varieties in southern region of Ethiopia. *Journal of Extension Systems, 15*(1), June, 70-78. Retrieved on 23 June 2009 from http://www.jesonline.org/1999jun.htm

Smith, M. K. (2002). Malcolm Knowles, informal adult education, self-direction and andragogy. *The encyclopedia of informal education.* Retrieved on 13 June 2009, from http://www.infed.org/thinkers/et-knowl.htm

Smith, M. K. (2001). Donald Schön: learning, reflection and change. *The encyclopedia of informal education.* Retrieved on 17 June 2009, from www.infed.org/thinkers/et-schon.htm

SNNPRS (May, 2000 E.C/2008). *Resources and Development Bottlenecks in SNNPRS: Part 1*. Working paper, Hawassa, SNNPRS [Translated from the Amharic Version].

Soddo-zuria Woreda (2001 E.C/2009). *Soddo-zuria Woreda population size.* Working paper, Soddo-zuria Woreda, Wolaita Zone.

Spencer, L. M. Jr. & Spencer, S.M. (1993). *Competency at work: Model for superior performance*. New York: John Wiley & Sons.

Sunny C. (n.d.). *Jack Mezirow transformational learning*. Retrieved on 13 June 2009, from http://www.lifecircles-inc.com/Learningtheories/humanist/mezirow.html

Tajima, S. (1991). Processes of development of agricultural extension in Japan. *Agricultural Extension in Asia and the Pacific* (19-36). Tokyo: Agricultural Productivity Organization.

Temel, T., Janssen, W. & Karimov, F. (2002). *The agricultural innovation system of Azerbaijan: An assessment of institutional linkages*. The Hague: International Service for National Agricultural Research (ISNAR).

Tessema, W. (2000). Stakeholder participation in policy processes in Ethiopia. *Managing Africa's Soils Series, N0.17.* London: International Institute for Environment and Development (IIED).

Tight, M. (2002). *Key Concepts in Adult Education and Training.* London & New York: Routledge Falmer.

UNESCO Institute for Education (2005). Foundations of Adult Education in Africa. Cape Town/South Africa: UNESCO Institute for Education.

Upton, M., (1992). Privatisation of agricultural input delivery systems. In *Food and agricultural policies under structural adjustment* (pp. 83-95). Proceedings of the 29th Seminar of the European Association of Agricultural Economists. Hohenheim University, Stuttgart, Germany.

Van Beek, P. (1997). Beyond technology transfer. *European Journal of Agricultural Education and Extension, 4*(3), 183–192.

Van den Ban, A.W. (2002). Increasing the ability of farmers to compete in the market. *Journal of Extension, 18*(2) Dec. 104-115. Retrieved on 22 June 2009 from http://www.jesonline.org/2002dec.htm

Van den Ban A.W. & Hawkins S. (1996). *Agricultural extension.* London: Longman.

Van Asten, P. J. A., Barro, S. E., Wopereis, M. C. S. & Defoer, T. (2004). Using farmer knowledge to combat low productive spots in rice field of a Sahelian irrigation scheme. *Land Degradation & Development 15,* 383–396.

Vroom, V. H. (1964). *Work and motivation.* San Francisco: Jossey Bass Publishers.

Weir, S. & Knight, J. (April 2000). *Adoption and diffusion of agricultural innovations in Ethiopia: The role of education.* Oxford: Centre for the Study of African Economies.

Whitley, B. E. (1996). *Principles of research in behavioural science.* Mountain View, California: Mayfield Publishing Company.

World Bank (1996). *World Bank participation source book.* Washington, D.C.: World Bank.

World Bank (2000). *Agricultural extension: generic challenges and some ingredients for solutions*. Work paper 2000 series. Retrieved on 22 April 2009, from http://www.worldbank.org/html/dec/Publications/Workpapers/wps2000series/wps2129/wps2129.pdf

Yu, C.H. (n.d.). An introduction to computing and interpreting Cronbach's Coefficient Alpha in SAS. *Statistics, Data Analysis, and Data Mining. Paper* 246-26. Retrieved on 09 July 2009 from http://www2.sas.com/proceedings/sugi26/p246-26.pdf

# APPENDICES

## Appendix A: Some Statistical Tests

### Table 35: An Independent T-test on Age of Male and Female Farmers

| Sex | Mean | SD | t | Sig. |
|---|---|---|---|---|
| Male farmers | 42.31 | 9.8 | 1.0 | 0.32 |
| Female farmers | 40.77 | 7.4 | | |

$p < 0.05$
Source: Field Survey (2009)

### Table 36: Extension Induced Characteristics of Farmers

| Farmers' characteristics | Mean | SD | t | Sig. |
|---|---|---|---|---|
| **Frequency of contact with DAs** | | | | |
| Male farmers | 2.50 | 0.94 | | |
| Female farmers | 2.04 | 1.01 | | |
| Male and female farmers | 2.40 | 0.97 | 2.96 | 0.003* |
| **Motivation** | | | | |
| Male farmers | 2.43 | 0.56 | | |
| Female farmers | 1.88 | 0.53 | | |
| Male and female farmers | 2.31 | 0.59 | 6.24 | 0.000* |
| **Satisfaction** | | | | |
| Male farmers | 2.45 | 0.40 | | |
| Female farmers | 2.10 | 0.32 | | |
| Male and female farmers | 2.37 | 0.41 | 6.32 | 0.000* |
| **Empowerment** | | | | |
| Male farmers | 1.14 | 0.36 | | |
| Female farmers | 0.99 | 0.33 | | |
| Male and female farmers | 1.11 | 0.36 | 2.70 | 0.007* |

**Table 36: Continued**

| Farmers' characteristics | Mean | SD | t | Sig. |
|---|---|---|---|---|
| **Farmers' participation as perceived by themselves** | | | | |
| Male farmers | 1.99 | 0.42 | | |
| Female farmers | 1.63 | 0.44 | | |
| Male and female farmers | 1.91 | 0.45 | 5.15 | 0.000* |
| **Farmers' participation as perceived by DAs** | 2.50 | 0.44 | | |
| DAs and farmers | 2.07 | 0.52 | 10.31 | 0.000* |

$p < 0.05$
* are statistically significant
N (Farmers, Male = 177, Female = 48; DAs = 85)
Scale: Freq. contact per month: 1= once, 2= twice, 3= three times, 4 = four times
Other variables: 1= Very low, 2= Low, 3= High, 4= Very high
Source: Field Data 2009

**Table 37: Development Agents' Participation in Extension, their Professional and Technical Competences**

| Variables | Mean | SD | t | Sig. |
|---|---|---|---|---|
| **Participation in Extension** | 2.61 | 0.42 | | |
| **Professional competence** | | | | |
| DAs themselves | 2.99 | 0.30 | | |
| Male farmers | 2.30 | 0.33 | | |
| Female farmers | 2.11 | 0.31 | | |
| Male and female farmers | 2.26 | 0.34 | 3.50 | 0.001* |
| Farmers and DAs | 2.46 | 0.46 | 17.43 | 0.000* |
| **Technical competence** | | | | |
| DAs themselves | 3.01 | 0.31 | | |
| Male farmers | 2.80 | 0.39 | | |
| Female farmers | 2.65 | 0.39 | | |
| Male and female farmers | 2.77 | 0.39 | 2.28 | 0.023 |
| Farmers and DAs | 2.83 | 0.39 | 5.18 | 0.000* |

$p < 0.05$; * are statistically significant
N (male farmers = 177, female farmers = 48, DAs = 85)
Scale: 1 = Very low, 2 = Low, 3 = High, 4 = Very high
Source: Field Survey (2009)

**Table 38: Extent of Availability of Support Systems to the PAES as Perceived by Farmers and Development Agents**

| Support system | Mean | SD | t | Sig |
|---|---|---|---|---|
| **Relevance of extension packages** | | | | |
| Male farmers | 2.22 | 0.41 | | |
| Female farmers | 1.82 | 0.44 | | |
| Male and female farmers | 2.14 | 0.45 | 5.97 | 0.000* |
| DAs | 2.23 | 0.35 | | |
| Farmers and DAs | 2.16 | 0.42 | 1.93 | 0.055 |
| **Timeliness of extension packages** | | | | |
| Male farmers | 2.32 | 0.48 | | |
| Female farmers | 2.20 | 0.44 | | |
| Male and female farmers | 2.29 | 0.48 | 1.62 | 0.110 |
| DAs | 2.25 | 0.35 | | |
| Farmers and DAs | 2.28 | 0.45 | 0.91 | 0.365 |
| **Adequacy of extension package** | | | | |
| Male farmers | 2.39 | 0.54 | | |
| Female farmers | 2.32 | 0.46 | | |
| Male and female farmers | 2.37 | 0.52 | 0.77 | 0.440 |
| DAs | 2.33 | 0.39 | | |
| Farmers and DAs | 2.36 | 0.49 | 0.80 | 0.426 |

**Table 38: Continued**

| Support system | Mean | SD | t | Sig |
|---|---|---|---|---|
| **Availability of market for produces** | | | | |
| Male farmers | 3.21 | 0.43 | | |
| Female farmers | 2.99 | 0.56 | | |
| Male and female farmers | 3.17 | 0.47 | 2.60 | 0.011* |
| DAs | 3.07 | 0.41 | | |
| Farmers and DAs | 3.14 | 0.46 | 1.60 | 0.111 |
| **Policy support (**response from DAs) | 2.02 | 0.47 | | |
| **Research support (**response from DAs) | 2.34 | 0.38 | | |
| **SMS support (**response from DAs) | 2.25 | 0.33 | | |

$p < 0.05$
* are statistically significant
N (male farmers = 177, female farmers = 48, DAs = 85);
Scale: 1 = Very low, 2 = Low, 3 = High, 4 = Very high;
Source: Field Survey (2009)

## Table 39: Correlation Matrix on the Data of Farmers' Responses

| Variables | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X14 | X15 | X16 | X17 | X18 | X19 | X20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Loc (X1) | 1 | -.040 | .071 | -.084 | -.119 | .050 | .003 | -0.078 | .084 | -.014 | .044 | .088 | -.057 | -.307** | -.009 | -.031 | -.236** | -.433** | -.082 | .023 |
| Sex (X2) | | 1 | .331** | .144* | .193** | .195** | .139* | 0.111 | .017 | .386** | .349** | .326** | .228** | .151* | .371** | .108 | .052 | .197** | .178** | .479** |
| Edu status (X3) | | | 1 | .229** | .052 | .182** | .173** | 0.048 | .043 | .438** | .377** | .594** | .364** | .188** | .552** | -.036 | .019 | .009 | .033 | .690** |
| Wealth status (X4) | | | | 1 | .178** | .484** | .410** | 0.084 | .233** | .463** | .485** | .380** | .418** | .277** | .365** | .046 | .065 | .154* | .308** | .503** |
| Years part. Ext (X5) | | | | | 1 | .105 | .190** | 0.422** | .246** | .243** | .248** | .079 | .205** | .209** | .068 | .037 | .012 | .367** | .225** | .153* |
| Freq. Cont. DA (X6) | | | | | | 1 | .257** | -0.037 | .101 | .343** | .325** | .317** | .281** | .261** | .287** | .137* | .083 | -.026 | .182** | .373** |
| Land size (X7) | | | | | | | 1 | 0.232** | .045 | .303** | .316** | .291** | .245** | .074 | .257** | -.123 | -.047 | .069 | .147* | .309** |
| Credit Yes/No (X8) | | | | | | | | 1 | | .129 | .116 | .086 | .167* | -.080 | .080 | -.151* | -.094 | .244** | .213** | .158* |
| Credit adq. (X9) | | | | | | | | | 1 | .023 | .226** | .085 | .102 | .177* | .003 | .097 | .049 | .100 | .136 | .143 |
| Motivation (X10) | | | | | | | | | | 1 | .499** | .492** | .453** | .406** | .580** | .066 | .079 | .174** | .369** | .666** |
| Satisfaction (X11) | | | | | | | | | | | 1 | .580** | .339** | .297** | .493** | .228** | .156* | .092 | .346** | .620** |
| Part. rate in ext (X12) | | | | | | | | | | | | 1 | .361** | .264** | .706** | .140* | .124 | -.004 | .163* | .779** |
| DA prof. comp (X13) | | | | | | | | | | | | | 1 | .357** | .379** | -.023 | -.029 | .114 | .314** | .525** |
| DA tech. comp (X14) | | | | | | | | | | | | | | 1 | .315** | .301** | .275** | .206** | .181** | .355** |
| Tech. relevance (X15) | | | | | | | | | | | | | | | 1 | -.009 | .018 | .095 | .191** | .790** |
| Tech. timely (X16) | | | | | | | | | | | | | | | | 1 | .627** | .158* | .096 | .054 |
| Tech. adeq. (X17) | | | | | | | | | | | | | | | | | 1 | .185** | .103 | .062 |
| Market avail. (X18) | | | | | | | | | | | | | | | | | | 1 | .315** | .108 |
| Empowerment (X19) | | | | | | | | | | | | | | | | | | | 1 | .223** |
| Effectiveness (X20) | | | | | | | | | | | | | | | | | | | | 1 |

N = 225

** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed); Source: Field Survey (2009)

**Table 40: Correlation Matrix on the Data of DAs' Responses**

| Variables | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 | X13 | X14 | X15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age DA (X1) | 1 | .851** | -.112 | .193 | .357** | .097 | .639** | .433** | .259* | -.004 | .086 | -.036 | .172 | .430** | .474** |
| Service as DA (X2) | | 1 | -.093 | .135 | .330** | .141 | .645** | .473** | .183 | -.042 | .051 | -.023 | .059 | .440** | .513** |
| Credit Adequacy (X3) | | | 1 | -.037 | -.042 | -.054 | -.176 | -.045 | .080 | .128 | .044 | -.057 | -.223 | -.024 | -.010 |
| Policy Supp.(X4) | | | | 1 | -.067 | .028 | -.055 | -.092 | .120 | .164 | .367** | .435** | .090 | -.162 | -.182 |
| SMS Supp.(X5) | | | | | 1 | .298** | .645** | .687** | .098 | -.225* | .104 | -.032 | .192 | .708** | .785** |
| Research Supp.(X6) | | | | | | 1 | .159 | .405** | -.014 | .227* | .231* | .233* | -.002 | .351** | .514** |
| DA Part(X7) | | | | | | | 1 | .575** | .188 | -.069 | -.011 | -.104 | .225* | .664** | .693** |
| Farmers' Part(X8) | | | | | | | | 1 | .169 | .031 | -.023 | -.084 | .139 | .651** | .828** |
| DA Prof(X9) | | | | | | | | | 1 | .325** | .052 | .036 | .144 | .148 | .122 |
| DA Tech(X10) | | | | | | | | | | 1 | .156 | .178 | .115 | -.091 | -.084 |
| PKG Avail(X11) | | | | | | | | | | | 1 | .655** | -.014 | .018 | .004 |
| PKG Adq(X12) | | | | | | | | | | | | 1 | -.080 | -.090 | -.037 |
| MKT Avail(X13) | | | | | | | | | | | | | 1 | .215* | .097 |
| PKG Relv(X14) | | | | | | | | | | | | | | 1 | .836** |
| Effectiveness of the PAES (X15) | | | | | | | | | | | | | | | 1 |

N = 85; ** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Source: Field Survey (2009)

**Appendix B: Amharic Version Questionnaires**

**የኮድ ቁጥር** _____

**የመረጃ ሰብሳቢው ስም** _____

**<u>ለአርሶ አደሮች የተዘጋጀ መጠይቅ</u> (Questionnaire to Farmers)**

***<u>የመጠይቁ ዓላማ</u>***

*የመጠይቁ ዓላማ ስለአርስዎ ስለ ግብርና ኤክስቴንሽን የሥራ ሂደት <u>ለመማር</u> ነው። የሚሰጡት መልስም በፍፁም <u>ሚስጥራዊነት</u> የሚያገዝ መሆኑን እየገለፅን ለጥያቄዎች ትክክለኛ መልስ በመስጠት እንዲተባበሩን <u>በአክብሮትና በትህትና</u> እንጠይቃለን።*

**እባክዎን ጥያቄዎቹን በተሰጠው ቦታ እንደአስፈላጊነቱ <u>*ይህን ምልክት*</u> [√] በማድረግ፣ <u>*ቁጥሮችን በመክበብ*</u> ወይም <u>*በባዶ ቦታው ላይ በመፃፍ*</u> ይመልሱልን።**

**A. <u>ስለ አርሶ አደሩ አጠቃላይ መሰረታዊ መረጃ</u>**

1. **ወረዳ** _____
2. ***ፆታ***
   1. **ወንድ** ------ [ ]
   2. **ሴት** ------- [ ]
3. ***ዕድሜ*** **(እስከ ያለፈው የልደት ቀን ድረስ)** _____ **ዓመት**
4. **የትምህርት ደረጃ**
   1. **ማንበብና መፃፍ የማይችል** -------- [ ]
   2. **ማንበብና መፃፍ ብቻ የሚችል** ---- [ ]
   3. **ክፍል** 1-4 ---------- [ ]
   4. **ክፍል** 5-8 ---------- [ ]
   5. **ክፍል** 9-12 ---------- [ ]
   6. **የተወሰነ የኮሌጅ ትምህርት** -------- [ ]
5. **የጋብቻ ሁኔታ**
   1. **ያላገባ/ች** ---------- [ ]
   2. **ያገባ/ች** ---------- [ ]
   3. **የተፋታ/ች** ---------- [ ]
   4. **ባል/ሚስት የሞተበት/ባት** --- [ ]
6. **ሃይማኖት**
   1. **ኦርቶዶክስ** ---------- [ ]
   2. **ሙስሊም** ---------- [ ]
   3. **ካቶሊክ** ---------- [ ]
   4. **ፕሮቴስታንት** ---------- [ ]
   5. **ሃይማኖት የሌለው/ላት** ---- [ ]
7. **የሀብት ደረጃ (<u>ከቀበሌ ኃላፊዎች የሚገኝ</u>)**
   1. **ድሃ** ---------- [ ]
   2. **መካከለኛ** ------ [ ]
   3. **ሀብታም** -------- [ ]
8. **ለምን ያህል ዓመት በግብርና ሥራ ላይ ቆይተዋል?** _____

9. ከግብርና ሥራ በተጨማሪ ከሚከተሉት የትኞቹን የሥራ ዓይነቶች ይሰራሉ?
   1. ሽክላ ---------- [ ]
   2. ብረታብረት ---------- [ ]
   3. አናፂነት ---------- [ ]
   4. ሽማ ---------- [ ]
   5. ጥልፍና ተዛማጅ ሥራዎች ---------- [ ]
   6. ስፌት ---------- [ ]
   7. አነስተኛ ንግድ ---------- [ ]
   8. በሌሎች ሰዎች የግብርና ስራ ላይ መስራት - [ ]
   9. ሌላ ካለ ይጠቀስ _____

10. በግብርና ኤክስቴንሽን ለስንት ዓመት ተሳትፈዋል? _____ ዓመት

11. ከልማት ሰራተኛ ጋር ግንኙነት ያደርጋሉ?

    1. አዎን -------- [ ]
    2. አላደርግም -- [ ]

12. ለተራ ቁጥር 12 መልስዎ "አዎን" ከሆነ በወር ስንት ጊዜ ግንኙነት ያደርጋሉ?
    1. በወር አንድ ጊዜ ---------- [ ]
    2. በወር ሁለት ጊዜ ---------- [ ]
    3. በወር ሦስት ጊዜ ---------- [ ]
    4. በወር ከአራት ጊዜ በላይ --- [ ]

13. ለተራ ቁጥር 12 መልስዎ "አላደርግም" ከሆነ ዋናዋና ምክንያትዎች ምንድን ናቸው?
    1._____
    2._____
    3._____
    4._____
    5._____
    6._____

## B. <u>የቤት ዓይነት፣የመሬት ይዞታ፣የአመታዊና Ìሚ ተክሎች እና የእንስሳት ዓይነትና መጠን</u>

1. የቤት ዓይነት
   1. የሳር ጣሪያ -------- [ ]
   2. የቆርቆሮ ጣሪያ --- [ ]

2. ጠቅላላ የመሬት ይዞታዎ የሚታረሰውን፣ ለግጦሽ የሚውለውን፣በቤት ዙሪያ ያለውንና ለሌላም አገልግሎት የሚውለውን ጨምሮ በጥማድ ሲታሰብ ምን ያህል ይሆናል? _____ጥማድ

3. በ2000 ዓ.ም የዘ…ቸውን አመታዊ ሰብሎችና በማሳዎ ላይ የነበሩ ነፃ ተክሎችን ዓይነትና የያዙትን የቦታ ስፋት በጥማድ ይግለጹ፡፡

| ተ.ቁ. | ሰብል/ነፃ ተክል | መጠን በጥማድ |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
| 9 | | |
| 10 | | |

4. ያለዎትን የእንስሳት ዓይነትና መጠን በቁጥር ይግለጹ፡፡

| ተ.ቁ | የእንስሳት ዓይነት | መጠን በቁጥር |
|---|---|---|
| 1 | ዶሮ | |
| 2 | ፍየል | |
| 3 | በግ | |
| 4 | በሬ/ወይፈን | |
| 5 | ላም/ጊደር | |
| 6 | ጥጃ | |
| 7 | አህያ | |
| 8 | በቅሎ | |
| 9 | ፈረስ | |

## C. <u>በግብርና ኤክስቴንሽን አገልግሎት አማካኝነት በአርሶአደሮች ላይ የታዩ ለውጥ</u>

1. በእርስዎ ላይ በግብርና ኤክስቴንሽን አገልግሎት አማካኝነት የመጣ የተነሳሽነት ደረጃ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የተነሳሽነት ደረጃ</u>**

0= ምንም አልተነሳሳሁም
1= በጣም አነስተኛ
2 = አነስተኛ
3= ከፍተኛ
4 = በጣም ከፍተኛ

| ኮድ | የተነሳሽነት ደረጃ መለኪያዎች | የተነሳሽነት ደረጃ | | | | |
|---|---|---|---|---|---|---|
| M1 | አዳዲስ ነገሮችን ለማሰብ ተነሳስቻለሁ | 0 | 1 | 2 | 3 | 4 |
| M2 | በስብሰባ ጊዜ ማለት የምፈልገውን እንድል አግዞኛል | 0 | 1 | 2 | 3 | 4 |
| M3 | ከልማት ሰራተኞች ጋር ስሰራ የእኩልነት ስሜት እንዲሰማኝ አድርጎኛል | 0 | 1 | 2 | 3 | 4 |
| M4 | የግብርና ሥራዬን እንቅስቃሴ በጥሩ ሁኔታ ወስኜ እንድሰራ አስችሎኛል | 0 | 1 | 2 | 3 | 4 |
| M5 | በግብርና ኤክስቴንሽን ስራዬ ተሳትፎአዊ ክትትል እንዳደርግ አግዞኛል | 0 | 1 | 2 | 3 | 4 |
| M6 | የግብርና ኤክስቴንሽንን ውጤት በተሳትፎአዊ ግምገማ እንድረዳ አስችሎኛል | 0 | 1 | 2 | 3 | 4 |
| M7 | የግብርና ስራዬን በተመለከተ ከተለያዩ ድርጅቶች እገዛ እንዳገኝ አነሳስቶኛል | 0 | 1 | 2 | 3 | 4 |
| M8 | በግብርና ስራዬ ውጤታማ ስሆን ስለምበረታታ የበለጠ ተነሳሽነቴ ጨም…ል | 0 | 1 | 2 | 3 | 4 |

2. በግብርና ኤክስቴንሽን አገልግሎት የእርካታ ደረጃዎ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የእርካታ መጠን</u>**

0= ምንም አልረካሁም
1= በጣም አነስተኛ
2 = አነስተኛ
3= ከፍተኛ
4 = በጣም ከፍተኛ

| ኮድ | የእርካታ ደረጃ መለኪያዎች | የእርካታ ደረጃ | | | | |
|---|---|---|---|---|---|---|
| S1 | የግብርና ስራ ለምን ዓላማ እንደሚሰራ ከመጀመሪያውኑ ያለው ግልፅነት | 0 | 1 | 2 | 3 | 4 |
| S2 | በግብረና ኤክስቴንሽን ስራ የሁለትዮሽ ኮሙኒኬሽን (ንግግር/ውይይት) መኖሩ | 0 | 1 | 2 | 3 | 4 |
| S3 | የግብርና ኤክስቴንሽን አገልግሎት ያለዎትን ዕውቀትና ልምድ ያካተተ መሆኑ | 0 | 1 | 2 | 3 | 4 |
| S4 | የግብርና ኤክስቴንሽን አገልግሎት ከፍላጎትዎ ጋር የተጣጣመ መሆኑ | 0 | 1 | 2 | 3 | 4 |
| S5 | የግብርና ኤክስቴንሽን አገልግሎት ወቅታዊ መረጃ መስጠቱ | 0 | 1 | 2 | 3 | 4 |
| S6 | የግብርና ኤክስቴንሽን ትምህርት የመረዳት አቅምዎን ያገናዘበ መሆኑ | 0 | 1 | 2 | 3 | 4 |
| S7 | የግብርና ኤክስቴንሽን አገልግሎት ያልተዛባ መረጃ መስጠቱ | 0 | 1 | 2 | 3 | 4 |
| S8 | የግብርና ኤክስቴንሽን ትምህርት ለመስጠት ምቹ ዘዴ መጠቀሙ | 0 | 1 | 2 | 3 | 4 |
| S9 | የግብርና ኤክስቴንሽን ትምህርት ለመስጠት ምቹ የመማሪያ ቁሳቁሶችን መጠቀሙ | 0 | 1 | 2 | 3 | 4 |
| S10 | የግብርና ኤክስቴንሽን አገልግሎት የኢኮኖሚ አቅምዎን ያገናዘበ መሆኑ | 0 | 1 | 2 | 3 | 4 |
| S11 | የግብርና ኤክስቴንሽን አገልግሎት የስነ-ፆታ ልዩነትን ያገናዘበ መሆኑ | 0 | 1 | 2 | 3 | 4 |
| S12 | የግብርና ኤክስቴንሽን አገልግሎት የስነ-ምህዳር ልዩነትን ያገናዘበ መሆኑ | 0 | 1 | 2 | 3 | 4 |
| S13 | የግብርና ኤክስቴንሽን አገልግሎት ከሌሎች አጋዥ ድርጅቶች ጋር ግንኙነት መፍጠር አንዲችሉ ማገዙ | 0 | 1 | 2 | 3 | 4 |
| S14 | የግብርና ኤክስቴንሽን አገልግሎት መስጫ ማዕከል ቅርበት | 0 | 1 | 2 | 3 | 4 |
| S15 | የግብርና ኤክስቴንሽን አገልግሎት መስጫ ሰርቶ ማሳያዎችና የስብሰባ ቦታዎች ምቹነት | 0 | 1 | 2 | 3 | 4 |
| S16 | የግብርና ኤክስቴንሽን አገልግሎት በአርሶ አደሮች መሀከል የእርስ በርስ መማማርን ማስተባበሩ | 0 | 1 | 2 | 3 | 4 |
| S17 | የግብርና ኤክስቴንሽን አገልግሎት የግብርና ምርትዎ እንዲጨምር ያደረገው አስተዋፅዎ | 0 | 1 | 2 | 3 | 4 |
| S18 | በግብርና ኤክስቴንሽን ፕሮገራም በመሳተፍዎ ያገኙት ዕውቀት | 0 | 1 | 2 | 3 | 4 |
| S19 | በግብርና ኤክስቴንሽን ፕሮገራም በመሳተፍዎ ያገኙት ክህሎት | 0 | 1 | 2 | 3 | 4 |
| S20 | የግብርና ኤክስቴንሽን አገልግሎት የአርሶ አደሮችን የምርምርና ኤክስቴንሽን አቅም ማጎልበቱ | 0 | 1 | 2 | 3 | 4 |
| S21 | የግብርና ኤክስቴንሽን አገልግሎት የግብርና ስራን በተመለከተ በአርሶ አደሮች ላይ ያመጣው አዎንታዊ የባህሪ ለውጥ | 0 | 1 | 2 | 3 | 4 |

3. በግብርና ኤክስቴንሽን ስራ ከመሳተፍዎ በፊትና መሳተፍ ከጀመሩ በ“ላ በራስ የመተማመን ደረጃዎ ምን የህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>በራስ የመተማመን ደረጃ</u>**

0= ምንም
1= በጣም አነስተኛ
2 = አነስተኛ
3= ከፍተኛ
4 = በጣም ከፍተኛ

| ከመሳተፍዎ በፊት በራስ የመተማመን ደረጃ | | | | | ኮድ | በራስ የመተማመን ደረጃ መለኪያዎች | መሳተፍ ከጀመሩ በ“ላ በራስ የመተማመን ደረጃ | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | E1 | ለውሳኔ የሚያገለግሉ መረጃዎች ማግኘትን በተመለከተ | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | E2 | የግብርና ስራን በተመለከተ ውሳኔ የመስጠት አቅምዎ | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | E3 | በማንኛውም ሥራዎ በራስዎ መተማመን | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | E4 | አዳዲስ አሰራሮችን ለማመንጨት ያለዎት አቅም | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | E5 | ለሚያጋጥመዎ የግብርና ችግር በራስዎ መንገድ መፍትሄ ማግኘት | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | E6 | የግብርና ስራዎን ተገቢ መለኪያዎችን ተጠቅመው ክትትል የማድረግ አቅም | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | E7 | የራስዎን እውቀትና ልምድ ከሌላ ሰው/ድርጅት እውቀት ጋር የማገናኘት አቅምዎ | 0 | 1 | 2 | 3 | 4 |

**D. አርሶ አደሮች በግብርና ኤክስቴንሽን ዝግጅትና አሰጣጥ ያላቸው ተሳተፎ**

1. ከዚህ ቀጥሎ ከተመለከቱት የግብርና ኤክስቴንሽን ደረጃዎች ***<u>እርሰዎ</u>*** በየትኞቹ ተሳትፎ እንደሚያደርጉ፣የተሳትፎ ደረጃዎ ምን ያህል እንደሆነና እንዴት እንደሚሳተፉ ይግለፁ፡፡

| **ኮድ** | **የተሳትፎ ደረጃ መለኪያዎች** | **ይሳተፋሉን?** | | ***መልስዎ “ እሳተፋለሁ” ከሆነ የተሳትፎ ደረጃውን ያመልክቱ*** | | | | ***መልስዎ “ እሳተፋለሁ” ከሆነ እንዴት እንደሚሳተፉ ይግለፁ*** |
|---|---|---|---|---|---|---|---|---|
| | | **1 አዎን** | **2 አልሳተፍም** | **1 በጣም አነስተኛ** | **2 አነስተኛ** | **3 ከፍተኛ** | **4 በጣም ከፍተኛ** | |
| p1 | በፍላጎት አሰሳና ችግርን በመለየት ይሳተፋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p2 | የተለያዩ የኤክስቴንሽን አማራጮችን በመለየት ላይ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p3 | በተለዩ የኤክስቴንሽን አማራጮች ምን ዓይነት የኤክስቴንሽን ሥራ መሰራት እንዳለበት በሚደረግ እንቅስቃሴ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p4 | ለአርሶ አደሮች የሚሰጥ የግብርና ኤክስቴንሽን ትምህርት ይዘት ምን መሆን እንዳለበት በሚደረግ ውሳኔ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p5 | ለአርሶ አደሮች የሚሰጥ የግብርና ኤክስቴንሽን በምን ዘዴ መሆን እንዳለበት በሚደረግ ውሳኔ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p6 | በግብርና ኤክስቴንሽን የክትትል መርሃ ግብር ላይ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p7 | በግብርና ኤክስቴንሽን የግምገማ መርሃ ግብር ላይ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |

## E. የልማት ሠራተኞች ሙያዊና ቴክኒካዊ ብቃት

1. የልማት ሠራተኞች ሙያዊ ብቃት ምን ያህል እንደሆነ ቁጥሮችን በመክበብ ያመልክቱ፡፡

<u>የልማት ሠራተኞች ሙያዊ ብቃት ደረጃ</u>

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የሙያዊ ብቃት መለኪያዎች | የሙያዊ ብቃት ደረጃ | | | |
|---|---|---|---|---|---|
| Dp1 | የአንድ በአንድ ኮሙኒኬሽን ብቃት | 1 | 2 | 3 | 4 |
| Dp2 | የቡድን ኮሙኒኬሽን ብቃት | 1 | 2 | 3 | 4 |
| Dp3 | የማደራጀትና ቡድን የመመስረት ብቃት | 1 | 2 | 3 | 4 |
| Dp4 | መልዕክቶችንና መረጃዎችን አርሶ አደሮች በሚረዱት መልክ የማቅረብ ብቃት | 1 | 2 | 3 | 4 |
| Dp5 | የግብርና ኤክስቴንሽን ትምህርትን በምሳሌያዊ አነጋገሮች የማገዝ ብቃት | 1 | 2 | 3 | 4 |
| Dp6 | አርሶ አደሮችን የማዳመጥ ብቃት | 1 | 2 | 3 | 4 |
| Dp7 | አመራር የመስጠት ብቃት | 1 | 2 | 3 | 4 |
| Dp8 | የተለያዩ ቡድን አርሶ አደሮችን ፍላጎት በሚገባ የማስተናገድ ብቃት | 1 | 2 | 3 | 4 |
| Dp9 | ለአርሶ አደሮች ችግር መፍትሄ የማፈላለግና የመስጠት ብቃት | 1 | 2 | 3 | 4 |
| Dp10 | ተገቢ የሆነ የኦዲዮ ቪዡዋል አጠቃቀም ብቃት | 1 | 2 | 3 | 4 |
| Dp11 | በአርሶ አደሮች ውስጥ ተሳትፎአዊ የመማማር ሂደትንና የሥራ እንቅስቃሴን የመፍጠር ብቃት | 1 | 2 | 3 | 4 |
| Dp12 | የአርሶ አደሮችን የሥራ ሂደት የመጎብኘት ብቃት | 1 | 2 | 3 | 4 |
| Dp13 | ከአርሶ አደሮች ጋር የግብርና ኤክስቴንሽን የሥራ ሂደትን የመከታተል ብቃት | 1 | 2 | 3 | 4 |
| Dp14 | ከአርሶ አደሮች ጋር የግብርና ኤክስቴንሽን የሥራ ሂደትን የመገምገም ብቃት | 1 | 2 | 3 | 4 |

2. እርስዎ የሚሳተፉባቸውን የፓኬጅ ዓይነቶች በመለየት የልማት ሠራተኞች ቴክኒካዊ ብቃት ምን ያህል እንደሆነ ቁጥሮችን በመክበብ ያመልክቱ፡፡

<u>**የልማት ሠራተኞች ቴክኒካዊ ብቃት ደረጃ**</u>

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የቴክኒካዊ ብቃት ደረጃ መለኪያዎች | የቴክኒካዊ ብቃት ደረጃ | | | |
|---|---|---|---|---|---|
| Dt1 | መሬት ለዘር ለማዘጋጀት የሠርቶ ማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt2 | ትክክለኛ የዘር ወቅትን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt3 | የችግኝ ቦታ መረጣና የማዘጋጀት ብቃት | 1 | 2 | 3 | 4 |
| Dt4 | አፈርና ውሃን የሚያቅብ የአተራረስ ዘይን የማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt5 | አፈርና ውሃን የሚያቅብ መካኒካል ዘዴዎችን የማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt6 | አፈርና ውሃን የሚያቅቡ ሥነ-ህይዎታዊ ዘዴዎችን የማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt7 | ውሃ የማቆር ብቃት | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Dt8 | የመስኖ ሥራ ዕወቀት | 1 | 2 | 3 | 4 |
| Dt9 | የኮምፖስት ዝግጅትና አጠቃቀም የማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt10 | የማዳበሪያ አጠቃቀም ዘዴዎችንና ጊዜውን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt11 | የአረም ዓይነቶችንና የመቆጣጠሪያ ዘዴዎችን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt12 | ሰብል የሚያጠቁ ነፍሳትን የመለየትና የመቆጣጠር ብቃት | 1 | 2 | 3 | 4 |
| Dt13 | ሰብል የሚያጠቁ በሽታዎችን የመለየትና የመቆጣጠር ብቃት | 1 | 2 | 3 | 4 |
| Dt14 | ትክክለኛ የሰብል መሰብሰቢያ ጊዜን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt15 | ትክክለኛ የድህረ-ምርት አያያዝን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt16 | ለወተትና ለስጋ የሚሆኑ ከብቶችን ለይቶ የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt17 | አንዲት ላም መቼ መጠቃት እንዳለባት ለይቶ የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt18 | ትክክለኛ የከብት ምግብ አያያዝን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt19 | ለእንቁላልና ለስጋ የሚሆኑ ዶሮዎችን ለይቶ የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt20 | እንስሳትን የሚያጠቁ በሽታዎችን የመለየትና የመቆጣጠር ብቃት | 1 | 2 | 3 | 4 |
| Dt21 | ትክክለኛና ወቅታዊ የሆነ የሰብልና የእንስሳት የገበያ መረጃ የመስጠት ብቃት | 1 | 2 | 3 | 4 |

F. እርስዎ የሚሳተፉባቸውን የፓኬጅ ዓይነቶች በመለየት በግብርና ኤክስቴንሽን አገልግሎት የሚቀርቡ ፓኬጆች ለእርስዎ ምን ያህል ጠቃሚ እንደሆኑ ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የፓኬጆች ጠቃሚነት ደረጃ</u>**

0. ምንም ጠቃሚ አይደለም
1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የፓኬጆች ዓይነት | የጠቃሚነት ደረጃ | | | | |
|---|---|---|---|---|---|---|
| Rp1 | የተፈጥሮ ሀብት እንክብካቤ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp2 | የጥራጥሬ (cereals) ሰብሎች አመራረትና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp3 | የሆርቲካልቸር ሰብሎች አመራረትና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp4 | የዶሮ እርባታና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp5 | የበግና ፍየል እርባታና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp6 | የወተት ላም አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp7 | የድለባ ከብት አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp8 | የእንሰሳት መኖ ዝግጅትና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp9 | የእርሻ መሳሪያዎች አጠቃቀም ፓኬጅ | 0 | 1 | 2 | 3 | 4 |

G. ለግብርና ኤክስቴንሽን አገልግሎት የሚደረጉ ድጋፎች

1. እርስዎ የሚሳተፉባቸውን የፓኬጅ ዓይነቶች በመለየት የግብርና ኤክስቴንሽን ግብአቶች በፈለጉበት ጊዜ መገኘታቸውን አስመልክቶ ምን ያህል እንደሆነ ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>በተፈለገው ጊዜ የመገኘት ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የግብዓት ዓይነት | በተፈለገው ጊዜ የመገኘት ደረጃ | | | |
|---|---|---|---|---|---|
| Avt1 | የሰብል ዘሮች | 1 | 2 | 3 | 4 |
| Avt2 | የአታክልት ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt3 | የመኖ ተክል ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt4 | ማዳበሪያ | 1 | 2 | 3 | 4 |
| Avt5 | የሰብልና የእንስሳት ተባይ መቆጣጠሪያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt6 | የእንስሳት የህክምና ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt7 | የዶሮ ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt8 | የእንስሳት ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt9 | የእርሻ መሳሪያ ግብዓቶች | 1 | 2 | 3 | 4 |

2. እርስዎ የሚሳተፉባቸውን የፓኬጅ ዓይነቶች በመለየት የግብርና ኤክስቴንሽንግብአቶች በፈለጉት መጠን መገኘታቸውን አስመልክቶ ምን ያህል እንደሆነ ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>በተፈለገው መጠን የመገኘት ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የግብዓት ዓይነት | በተፈለገው መጠን የመገኘት ደረጃ | | | |
|---|---|---|---|---|---|
| Avq1 | የሰብል ዘሮች | 1 | 2 | 3 | 4 |
| Avq2 | የአታክልት ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq3 | የመኖ ተክል ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq4 | ማዳበሪያ | 1 | 2 | 3 | 4 |
| Avq5 | የሰብልና የእንስሳት ተባይ መቆጣጠሪያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq6 | የእንስሳት የህክምና ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq7 | የዶሮ ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq8 | የእንስሳት ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq9 | የእርሻ መሳሪያ ግብዓቶች | 1 | 2 | 3 | 4 |

3. የግብርና ሥራዎን ለማከናወን ብድር ከማንኛውም ምንጭ አግኝተው ያውቃሉን?
    1. አዎን----------[ ]
    2. አላገኘሁም-----[ ]

4. ለቀደመው ጥያቄ መልስዎ "አዎን" ከሆነ ያገኙት የብድር መጠን ከፍላጎትዎ ጋር ሲነፃፀር ምን ያህል እንደሆን ያመልክቱ፡፡
   1. በጣም አነስተኛ-----[ ]
   2. አነስተኛ----------[ ]
   3. ከፍተኛ----------[ ]
   4. በጣም ከፍተኛ------[ ]

5. እርስዎ የሚሳተፉባቸውን የፓኬጅ ዓይነቶች በመለየት በሰንጠረዡ ለተመለከቱት የግብርና ምርቶች ያለው ገበያ ምን ያህል አበረታች እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የገበያው አበረታታችነት ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የግብርና ምርት ዓይነት | <u>የገበያው አበረታችነት ደረጃ</u> | | | |
|---|---|---|---|---|---|
| Mkt1 | የጥራጥሬ ምርት | 1 | 2 | 3 | 4 |
| Mkt2 | ፍራፍሬ | 1 | 2 | 3 | 4 |
| Mkt3 | የቅጠላ ቅጠል ተክሎች | 1 | 2 | 3 | 4 |
| Mkt4 | የስራስር ተክሎች | 1 | 2 | 3 | 4 |
| Mkt5 | እንቁላል | 1 | 2 | 3 | 4 |
| Mkt6 | ዶሮ | 1 | 2 | 3 | 4 |
| Mkt7 | ፍየል | 1 | 2 | 3 | 4 |
| Mkt8 | በግ | 1 | 2 | 3 | 4 |
| Mkt9 | ወተት | 1 | 2 | 3 | 4 |
| Mkt10 | ቅቤ | 1 | 2 | 3 | 4 |
| Mkt11 | የደለበ እንስሳ | 1 | 2 | 3 | 4 |

## D. የግብርና ኤክስቴንሽን አገልግሎት አመርቂነት

1. በእርስዎ እይታ የግብርና ኤክስቴንሽን አርሶ አደሮችን በማገዝ ተልዕኮውን ከመወጣት አኳያ የሚያደርገው እንቅስቃሴ ምን ያህል ውጤታማና አመርቂ ነው ይላሉ?
   1. በጣም አነስተኛ-----[ ]
   2. አነስተኛ----------[ ]
   3. ከፍተኛ----------[ ]
   4. በጣም ከፍተኛ------[ ]

2. በእርስዎ እይታ የግብርና ኤክስቴንሽን ለአርሶ አደሮች የሚሰጠውን አገልግሎት በይበልጥ ለማሻሻልና አመርቂ እንቅስቃሴ ለማድረግ በልማት ሰራተኞችና በግብርና ኤክስቴንሽን በኩል ምን ቢደረግ ይሻላል ይላሉ?
   1. _____
   2. _____
   3. _____
   4. _____
   5. _____

የኮድ ቁጥር _____

**ለልማት ሠራተኞች የተዘጋጀ መጠይቅ (Questionnaire to Development Agents)**

***የመጠይቁ ዓላማ***

*የመጠይቁ ዓላማ ከእርስዎ ስለ ግብርና ኤክስቴንሽን የሥራ ሂደት ለመማር ነው። የሚሰጡት መልስም በፍፁም ሚስጥራዊነት የሚያዝ መሆኑን እየገለፅን ለጥያቄዎች ትክክለኛ መልስ በመስጠት እንዲተባበሩን በአክብሮትና በትህትና እንጠይቃለን።*

እባክዎን ጥያቄዎቹን በተሰጠው ቦታ እንደአስፈላጊነቱ ***ይህን ምልክት [√]*** በማድረግ፣ ***ቁጥሮችን በመክበብ*** ወይም ***በባዶ ቦታው ላይ በመፃፍ*** ይመልሱልን።

## A. ስለ ልማት ሠራተኛው አጠቃላይ መሰረታዊ መረጃ

1. ወረዳ _____

2. ፆታ
   1. ወንድ ------ [ ]
   2. ሴት --------- [ ]

3. ዕድሜ (እስከ ያለፈው የልደት ቀን ድረስ) _____ ዓመት

4. የጋብቻ ሁኔታ
   1. ያላገባ/ች ---------- [ ]
   2. ያገባ/ች ---------- [ ]
   3. የተፋታ/ች ---------- [ ]
   4. ባል/ሚስት የሞተበት/ባት --- [ ]

5. የትምህርት ደረጃ
   1. ሰርቲፊኬት ----[ ]
   2. ዲፕሎማ--------[ ]

6. የሰለጠኑበት የትምህርት መስክ
   1. እጽዋት ሳይንስ----------[ ]
   2. እንስሳት ሳይንስ/እርባታ-----[ ]
   3. አጠቃላይ ግብርና----------[ ]
   4. ተፈጥሮ ሀብት----------[ ]
   5. ሌላ ከሆነ ይግለጹ _____

7. በልማት ሠራተኛነት ለስንት ዓመት ሠርተዋል?
   _____ዓመት

**B. በግብርና ኤክስቴንሽን የስራ እንቅስቃሴ የልማት ሰራተኞችና የአርሶ አደሮች ተሳትፎ**

1. ከዚህ ቀጥሎ ከተመለከቱት የግብርና ኤክስቴንሽን ደረጃዎች ***<u>እርስዎ</u>*** በየትኞቹ ተሳትፎ እንደሚያደርጉ፣የተሳትፎ ደረጃዎ ምን ያህል እንደሆነና እንዴት እንደሚሳተፉ ይግለፁ፡፡

| ኮድ | የተሳትፎ ደረጃ መለኪያዎች | ይሳተፋሉን? | | መልስዎ “ እሳተፋለሁ” ከሆነ የተሳትፎ ደረጃውን ያመልክቱ | | | | መልስዎ “ እሳተፋለሁ” ከሆነ እንዴት እንደሚሳተፉ ይግለፁ |
|---|---|---|---|---|---|---|---|---|
| | | 1 አዎን | 2 አልሳተፍም | 1 በጣም አነስተኛ | 2 አነስተኛ | 3 ከፍተኛ | 4 በጣም ከፍተኛ | |
| p1 | በፍላጎት አሰሳና ችግርን በመለየት ይሳተፋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p2 | የተለያዩ የኤክስቴንሽን አማራጮችን በመለየት ላይ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p3 | በተለዩ የኤክስቴንሽን አማራጮች ምን ዓይነት የኤክስቴንሽን ሥራ መሰራት እንዳለበት በሚደረግ እንቅስቃሴ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p4 | ለአርሶ አደሮች የሚሰጥ የግብርና ኤክስቴንሽን ትምህርት ይዘት ምን መሆን እንዳለበት በሚደረግ ውሳኔ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p5 | ለአርሶ አደሮች የሚሰጥ የግብርና ኤክስቴንሽን በምን ዘዴ መሆን እንዳለበት በሚደረግ ውሳኔ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p6 | በግብርና ኤክስቴንሽን የክትትል መርሃ ግብር ላይ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |
| p7 | በግብርና ኤክስቴንሽን የግምገማ መርሃ ግብር ላይ ተሳትፎ ያደርጋሉን? | 1 | 2 | 1 | 2 | 3 | 4 | |

2. ከዚህ ቀጥሎ ከተመለከቱት የግብርና ኤክስቴንሽን ደረጃዎች ***<u>ሐርሶ አደሮች</u>*** በየትኞቹ ተሳትፎ እንደሚያደርጉ፣ የተሳትፎ ደረጃቸው ምን ያህል እንደሆነና እንዴት እንደሚሳተፉ ይግለፁ፡፡

| **ኮድ** | **የተሳትፎ ደረጃ መለኪያዎች** | **ይሳተፋሉን?** | | **መልሰዎ “ ይሳተፋሉ” ከሆነ የተሳትፎ ደረጃቸውን ያመልክቱ** | | | | **መልስዎ “ ይሳተፋሉ” ከሆነ እንዴት እንደሚሳተፉ ይግለፁ** |
|---|---|---|---|---|---|---|---|---|
| | | **1 አዎን** | **2 አይሳተፉም** | **1 በጣም አነስተኛ** | **2 አነስተኛ** | **3 ከፍተኛ** | **4 በጣም ከፍተኛ** | |
| Fp1 | **በፍላጎት አሰሳና ችግርን በመለየት ይሳተፋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |
| Fp2 | **የተለያዩ የኤክስቴንሽን አማራጮችን በመለየት ላይ ተሳትፎ ያደርጋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |
| Fp3 | **በተለዩ የኤክስቴንሽን አማራጮች ምን ዓይነት የኤክስቴንሽን ሥራ መሰራት እንዳለበት በሚደረግ እንቅስቃሴ ተሳትፎ ያደርጋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |
| Fp4 | **የግብርና ኤክስቴንሽን ትምህርት ይዘት ምን መሆን እንዳለበት በሚደረግ ውሳኔ ተሳትፎ ያደርጋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |
| Fp5 | **የግብርና ኤክስቴንሽን በምን ዘዴ መሆን እንዳለበት በሚደረግ ውሳኔ ተሳትፎ ያደርጋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |
| Fp6 | **በግብርና ኤክስቴንሽን የክትትል መርሃ ግብር ላይ ተሳትፎ ያደርጋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |
| Fp7 | **በግብርና ኤክስቴንሽን የግምገማ መርሃ ግብር ላይ ተሳትፎ ያደርጋሉን?** | 1 | 2 | 1 | 2 | 3 | 4 | |

## C. የልማት ሠራተኞች ሙያዊና ቴክኒካዊ ብቃት

1. የሙያዊ ብቃትዎ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

<u>የልማት ሠራተኞች ሙያዊ ብቃት ደረጃ</u>

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የሙያዊ ብቃት መለኪያዎች | የሙያዊ ብቃት ደረጃ | | | |
|---|---|---|---|---|---|
| Dp1 | የአንድ በአንድ ኮሙኒኬሽን ብቃት | 1 | 2 | 3 | 4 |
| Dp2 | የቡድን ኮሙኒኬሽን ብቃት | 1 | 2 | 3 | 4 |
| Dp3 | የማደራጀትና ቡድን የመመስረት ብቃት | 1 | 2 | 3 | 4 |
| Dp4 | መልዕክቶችንና መረጃዎችን አርሶ አደሮች በሚረዱት መልክ የማቅረብ ብቃት | 1 | 2 | 3 | 4 |
| Dp5 | የግብርና ኤክስቴንሽን ትምህርትን በምሳሌያዊ አነጋገሮች የማገዝ ብቃት | 1 | 2 | 3 | 4 |
| Dp6 | አርሶ አደሮችን የማዳመጥ ብቃት | 1 | 2 | 3 | 4 |
| Dp7 | አመራር የመስጠት ብቃት | 1 | 2 | 3 | 4 |
| Dp8 | የተለያዩ ቡድን አርሶ አደሮችን ፍላጎት በሚገባ የማስተናገድ ብቃት | 1 | 2 | 3 | 4 |
| Dp9 | ለአርሶ አደሮች ችግር መፍትሄ የማፈላለግና የመስጠት ብቃት | 1 | 2 | 3 | 4 |
| Dp10 | ተገቢ የሆነ የኦዲዮ ቪዡዋል አጠቃቀም ብቃት | 1 | 2 | 3 | 4 |
| Dp11 | በአርሶ አደሮች ውስጥ ተሳትፎአዊ የመማማር ሂደትንና የሥራ እንቅስቃሴን የመፍጠር ብቃት | 1 | 2 | 3 | 4 |
| Dp12 | የአርሶ አደሮችን የሥራ ሂደት የመጎብኘት ብቃት | 1 | 2 | 3 | 4 |
| Dp13 | ከአርሶ አደሮች ጋር የግብርና ኤክስቴንሽን የሥራ ሂደትን የመከታተል ብቃት | 1 | 2 | 3 | 4 |
| Dp14 | ከአርሶ አደሮች ጋር የግብርና ኤክስቴንሽን የሥራ ሂደትን የመገምገም ብቃት | 1 | 2 | 3 | 4 |

2. እርስዎን የሚመለከተውን በመለየት የቴክኒካዊ ብቃትዎ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

<u>የልማት ሠራተኞች ቴክኒካዊ ብቃት ደረጃ</u>

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የቴክኒካዊ ብቃት ደረጃ መለኪያዎች | የቴክኒካዊ ብቃት ደረጃ | | | |
|---|---|---|---|---|---|
| Dt1 | መሬት ለዘር ለማዘጋጀት የሠርቶ ማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt2 | ትክክለኛ የዘር ወቅትን የማወቅ ብቃት | 1 | 2 | 3 | 4 |
| Dt3 | የችግኝ ቦታ መረጣና የማዘጋጀት ብቃት | 1 | 2 | 3 | 4 |
| Dt4 | አፈርና ውሃን የሚያቅብ የአተራረስ ዘዴን የማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt5 | አፈርና ውሃን የሚያቅብ መካኒካል ዘዴዎችን የማሳየት ብቃት | 1 | 2 | 3 | 4 |
| Dt6 | አፈርና ውሃን የሚያቅቡ ሥነ-ህይዎታዊ ዘዴዎችን የማሳየት ብቃት | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Dt7 | ውሃ የማቆር ብቃት· | 1 | 2 | 3 | 4 |
| Dt8 | የመስኖ ሥራ ዕወቀት· | 1 | 2 | 3 | 4 |
| Dt9 | የኮምፖስት ዝግጅትና አጠቃቀም የማሳየት· ብቃት· | 1 | 2 | 3 | 4 |
| Dt10 | የማዳበሪያ አጠቃቀም ዘዴዎችንና ጊዜውን የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt11 | የአረም ዓይነቶችንና የመቆጣጠሪያ ዘዴዎችን የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt12 | ሰብል የሚያጠቁ ነፍሳትን የመለየትና የመቆጣጠር ብቃት· | 1 | 2 | 3 | 4 |
| Dt13 | ሰብል የሚያጠቁ በሽታዎችን የመለየትና የመቆጣጠር ብቃት· | 1 | 2 | 3 | 4 |
| Dt14 | ትክክለኛ የሰብል መሰብሰቢያ ጊዜን የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt15 | ትክክለኛ የድህረ-ምርት አያያዝን የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt16 | ለወተትና ለስጋ የሚሆኑ ከብቶችን ለይቶ የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt17 | አንዲት ላም መቼ መጠቃት እንዳለባት ለይቶ የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt18 | ትክክለኛ የከብት ምግብ አያያዝን የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt19 | ለእንቁላልና ለስጋ የሚሆኑ ዶሮዎችን ለይቶ የማወቅ ብቃት· | 1 | 2 | 3 | 4 |
| Dt20 | እንስሳትን የሚያጠቁ በሽታዎችን የመለየትና የመቆጣጠር ብቃት· | 1 | 2 | 3 | 4 |
| Dt21 | ትክክለኛና ወቅታዊ የሆነ የሰብልና የእንስሳት· የገበያ መረጃ የመስጠት· ብቃት· | 1 | 2 | 3 | 4 |

**D. እርስዎን የሚመለከተውን በመለየት· በግብርና ኤክስቴንሽን አገልግሎት· የሚቀርቡ ፓኬጆች ምን ያህል ጠቃሚ እንደሆኑቁጥሮችን በመክበብ ያመልክቱ፡፡**

**<u>የፓኬጆች ጠቃሚነት· ደረጃ</u>**

0. ምንም አይጠቅሙም
1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የፓኬጆች ዓይነት· | የጠቃሚነት· ደረጃ | | | | |
|---|---|---|---|---|---|---|
| Rp1 | የተፈጥሮ ሀብት· እንክብካቤ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp2 | የጥራጥሬ (cereals) ሰብሎች አመራረትና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp3 | የሆርቲካልቸር ሰብሎች አመራረትና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp4 | የዶሮ እርባታና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp5 | የበግና ፍየል እርባታና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp6 | የወተት· ላም አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp7 | የድለባ ከብት· አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp8 | የእንሰሳት· መኖ ዝግጅትና አያያዝ ፓኬጅ | 0 | 1 | 2 | 3 | 4 |
| Rp9 | የእርሻ መሳሪያዎች አጠቃቀም ፓኬጅ | 0 | 1 | 2 | 3 | 4 |

**E. ለግብርና ኤክስቴንሽን አገልግሎት የሚደረጉ ድጋፎች**

1. እርስዎን የሚመለከተውን በመለየት የግብርና ኤክስቴንሽን ግብአቶች አርሶ አደሮች በፈለጉበት ጊዜ መገኘታቸውን አስመልክቶ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>ግብዓቱ በተፈለገው ጊዜ የመገኘት ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የግብዓት ዓይነት | ግብዓቱ በተፈለገው ጊዜ የመገኘት ደረጃ | | | |
|---|---|---|---|---|---|
| Avt1 | የሰብል ዘሮች | 1 | 2 | 3 | 4 |
| Avt2 | የአታክልት ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt3 | የመኖ ተክል ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt4 | ማዳበሪያ | 1 | 2 | 3 | 4 |
| Avt5 | የሰብልና የእንሰሳት ተባይ መቆጣጠሪያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt6 | የእንሰሳት የህክምና ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt7 | የዶሮ ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt8 | የእንሰሳት ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avt9 | የእርሻ መሳሪያ ግብዓቶች | 1 | 2 | 3 | 4 |

2. እርስዎን የሚመለከተውን በመለየት የግብርና ግብአቶች አርሶ አደሮች በፈለጉት መጠን መገኘታቸውን አስመልክቶ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>በተፈለገው መጠን የመገኘት ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የግብዓት ዓይነት | በተፈለገው መጠን የመገኘት ደረጃ | | | |
|---|---|---|---|---|---|
| Avq1 | የሰብል ዘሮች | 1 | 2 | 3 | 4 |
| Avq2 | የአታክልት ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq3 | የመኖ ተክል ዘሮችና ሌሎች የማራቢያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq4 | ማዳበሪያ | 1 | 2 | 3 | 4 |
| Avq5 | የሰብልና የእንሰሳት ተባይ መቆጣጠሪያ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq6 | የእንሰሳት የህክምና ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq7 | የዶሮ ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq8 | የእንሰሳት ምግብ ግብዓቶች | 1 | 2 | 3 | 4 |
| Avq9 | የእርሻ መሳሪያ ግብዓቶች | 1 | 2 | 3 | 4 |

3. የግብርና ኤክስቴንሽን የስራ እንቅስቃሴን ከማገዝ አኳያ ምን ያህል የፖ/ሊሲ ድጋፍ እንዳለ ከታች ከተዘረዘሩት ነጥቦች ጋር በማገናዘብ ቁጥሮችን በመክበብ ያመልክቱ፡፡

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የፖሊሲ ድጋፍ መኖር መለኪያዎች | የፖሊሲ ድጋፍ ደረጃ | | | |
|---|---|---|---|---|---|
| Ps1 | በቂ የልማት ሠራተኞችን በመደበኛ ትምህርት አሰልጥኖ መመደብን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps2 | የልማት ሠራተኞች በስራ ላይ እያሉ በፍላጎት ላይ የተመሰረቱና ከስራቸው ጋር ተዛማጅ የሆኑ አጫጭር ስልጠናዎችን መስጠትን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps3 | ለመስክ የግብርና ኤክስቴንሽን የስራ እንቅስቃሴ በበቂ ሁኔታ በጀት መመደብን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps4 | በተለያዩ መንገዶች የልማት ሠራተኞችን ማበረታታትን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps5 | በቂ የአርሶ አደሮች ማሰልጠኛ ማዕከላትን ማììምን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps6 | አርሶ አደሮችን ለመጎብኘትና ለማገዝ በቂና አመች የመንገዳ አገልግሎት መኖሩን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps7 | የልማት ሠራተኞች በየጊዜው በራሳቸው መማር እንዲችሉ አጋዥ የመማሪያ ቁሳቁሶች መኖራቸውን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps8 | አርሶ አደሮች ራስ በራሳቸው የሚማሩበትን ሁኔታ ለመፍጠር የሚያስችል የመማሪያ ቁሳቁሶች መኖራቸውን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps9 | የልማት ሠራተኞች በወረዳቸው ውስጥና ከወረዳቸው ውጭ ልምድ የሚለዋወጡበት መድረክ መኖሩን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps10 | ለልማት ሠራተኞች በቂና ምቹ ቢሮዎችን ማዘጋጀትን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps11 | ለልማት ሠራተኞች ተገቢ የሆነ የዕድገት መሰላል መዘርጋትን በተመለከተ | 1 | 2 | 3 | 4 |
| Ps12 | የአርሶ አደሮችን የምርምርና ኤክስቴንሽን እንቅስቃሴ ከማበረታታት አኳያ | 1 | 2 | 3 | 4 |
| Ps13 | አርሶ አደሮች በህብረት ሥራ ተደራጅተው ራሳቸውን እንዲረዱ ማድረግን በተመለከተ | 1 | 2 | 3 | 4 |

4. እርስዎን የሚመለከተውን በመለየት ከታች ከተዘረዘሩት የግብርና ኤክስቴንሽን ፓኬጆች ጋር በተገናኘ መልኩ የምርምር ድጋፍ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የምርምር ድጋፍ ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| ኮድ | የፓኬጆች ዓይነት | የምርምር ድጋፍ ደረጃ | | | |
|---|---|---|---|---|---|
| Rs1 | የተፈጥሮ ሀብት እንክብካቤ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs2 | የጥራጥሬ (cereals) ሰብሎች አመራረትና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs3 | የሆርቲካልቸር ሰብሎች አመራረትና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs4 | የዶሮ እርባታና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs5 | የበግና ፍየል እርባታና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs6 | የወተት ላም አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Rs7 | የድለባ ከብት አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs8 | የእንስሳት መኖ ዝግጅትና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| Rs9 | የእርሻ መሳሪያዎች አጠቃቀም ፓኬጅ | 1 | 2 | 3 | 4 |

5. እርስዎን የሚመለከተውን በመለየት ከታች ከተዘረዘሩት የግብርና ኤክስቴንሽን ፓኬጆች ጋር በተገናኘ መልኩ የሰለጠኑ ባለሙያዎች (Subject Matter Specialists) ድጋፍ ምን ያህል እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የሰለጠኑ ባለሙያዎችድጋፍ ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| **ኮድ** | **የፓኬጆች ዓይነት** | **የሰለጠኑ ባለሙያዎች ድጋፍ ደረጃ** | | | |
|---|---|---|---|---|---|
| SMS1 | የተፈጥሮ ሀብት እንክብካቤ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS2 | የጥራጥሬ (cereals) ሰብሎች አመራረትና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS3 | የሆርቲካልቸር ሰብሎች አመራረትና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS4 | የዶሮ እርባታና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS5 | የበግና ፍየል እርባታና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS6 | የወተት ላም አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS7 | የድለባ ከብት አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS8 | የእንስሳት መኖ ዝግጅትና አያያዝ ፓኬጅ | 1 | 2 | 3 | 4 |
| SMS9 | የእርሻ መሳሪያዎች አጠቃቀም ፓኬጅ | 1 | 2 | 3 | 4 |

6. አርሶ አደሮች የግብርና ሥራቸውን ለማከናወን ብድር ከማንኛውም ምንጭ አግኝተው ያውቃሉን?
    1. አዎን----------[ ]
    2. አላገኙም------[ ]

7. ለቀደመው ጥያቄ መልስዎ "አዎን" ከሆነ ያገኙት የብድር መጠን ከፍላጎታቸው ጋር ሲነፃፀር በእርስዎ እይታ ምን ያህል እንደሆን ያመልክቱ፡፡
    1. በጣም አነስተኛ----------[ ]
    2. አነስተኛ----------[ ]
    3. ከፍተኛ----------[ ]
    4. በጣም ከፍተኛ----------[ ]
8. እርስዎን የሚመለከተውን በመለየት በሰንጠረዥ ለተመለከቱት የግብርና ምርቶች ያለው ገበያ ለአርሶ አደሮች ምን ያህል አበረታታች እንደሆን ቁጥሮችን በመክበብ ያመልክቱ፡፡

**<u>የገበያው አበረታታችነት ደረጃ</u>**

1. በጣም አነስተኛ
2. አነስተኛ
3. ከፍተኛ
4. በጣም ከፍተኛ

| **ኮድ** | **የግብርና ምርት ዓይነት** | **<u>የገበያው አበረታታችነት ደረጃ</u>** | | | |
|---|---|---|---|---|---|
| Mkt1 | የጥራጥሬ ምርት | 1 | 2 | 3 | 4 |
| Mkt2 | ፍራፍሬ | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Mkt3 | **የቅጠላ ቅጠል ተክሎች** | 1 | 2 | 3 | 4 |
| Mkt4 | **የስራስር ተክሎች** | 1 | 2 | 3 | 4 |
| Mkt5 | **እንቁላል** | 1 | 2 | 3 | 4 |
| Mkt6 | **ዶሮ** | 1 | 2 | 3 | 4 |
| Mkt7 | **ፍየል** | 1 | 2 | 3 | 4 |
| Mkt8 | **በግ** | 1 | 2 | 3 | 4 |
| Mkt9 | **ወተት** | 1 | 2 | 3 | 4 |
| Mkt10 | **ቅቤ** | 1 | 2 | 3 | 4 |
| Mkt11 | **የደለበ እንሰሳ** | 1 | 2 | 3 | 4 |

## F. የግብርና ኤክስቴንሽን አገልግሎት አመርቂነት

1. **የግብርና ኤክስቴንሽን አርሶ አደሮችን በማገዝ ተልዕኮውን ከመወጣት አኳያ የሚያደርገው እንቅስቃሴ በእርስዎ እይታ ምን ያህል አመርቂ ነው ይላሉ**?
    1. **በጣም አነስተኛ**------[ ]
    2. **አነስተኛ**----------[ ]
    3. **ከፍተኛ**----------[ ]
    4. **በጣም ከፍተኛ**--------[ ]

2. **የግብርና ኤክስቴንሽን ለአርሶ አደሮች የሚሰጠውን አገልግሎት በይበልጥ ለማሻሻልና አመርቂ እንቅስቃሴ ለማድረግ በልማት ሰራተኞችና በኤክስቴንሽን ቢሮ ምን ቢደረግ ይሻላል ይላሉ**?
    1. _____
    2. _____
    3. _____
    4. _____
    5. _____

## Appendix C: English Version Questionnaires

Code $N_0$. _____

**QUESTIONNAIRES FOR FARMERS**

***Please, kindly respond to the questions by putting a tick mark [√] or writing where appropriately.***

**A. General background information on farmers**

1. Name of respondent _____
2. Woreda _____
3. Sex of the respondent
   1. Male ..... [ ]
   2. Female ..... [ ]
4. Age of the respondent in years at last birth day _____
5. Level of education of the respondent
   1. Illiterate/unable to read and write ---- [ ]
   2. Only read and write ---------- [ ]
   3. Grade 1-4 ---------- [ ]
   4. Grade 5-8 ---------- [ ]
   5. Grade 9-12 ---------- [ ]
   6. Some college education ---------- - [ ]
6. Marital status of the respondent
   1. Single---------- [ ]
   2. Married---------- [ ]
   3. Divorced---------- [ ]
   4. Widower/Widow--- [ ]
7. Religion of the respondent
   1. Orthodox ------ [ ]
   2. Muslim ------- [ ]
   3. Catholic ------ [ ]
   4. Protestant ----- [ ]
   5. Not religious --- [ ]
8. Wealth status of the respondent (to be obtained from *Kebele* leaders)
   1. Poor ---------- [ ]
   2. Medium -------- [ ]
   3. Better off (rich) --- [ ]
9. For how many years have you been involved in farming? _____ years
10. Which of the following non/off-farm activities do you undertake in addition to your farm activities? (Please, encircle appropriately. Multiple responses

are possible.)

1. Pottery ---------- [ ]
2. Blacksmithing ---------- [ ]
3. Carpentry ---------- [ ]
4. Weaving of *shama* (cloth) -------- [ ]
5. Embroidery ---------- [ ]
6. Sewing crafts ---------- [ ]
7. Petty trading ---------- [ ]
8. Casual labourer on others' farm -- [ ]
9. Others (specify) _____

11. For how many years have you been involved in agricultural extension programmes? _____ years

12. Do you contact a development agent?
    1. Yes --- [ ]
    2. No --- [ ]

13. If "Yes" for question number 12, please, indicate the number of contacts you usually have with an extension agent in a month.
    1. Rare contact (once in a month) ---------- [ ]
    2. Occasional contact (twice in a month) ---------- [ ]
    3. Frequent contact (thrice in a month) ---------- [ ]
    4. Very frequent contact (more than four times in a month) ---- [ ]

14. If "No" for question number 12, what are your main reasons for not contacting? 1
    1. _____
    2. _____
    3. _____
    4. _____
    5. _____

**B. House type, land holding, crops grown and livestock possessed**

1. Indicate the house type you live in
   1. Thatched roof ---------- [ ]
   2. Corrugated iron-sheet roof ----[ ]

2. Please, indicate the total area of land you have in *timad* (including area under cultivation, area left for grazing, homestead, and other purpose) _____

3. Please, indicate all annual and perennial crops that occupy your land in 2000 E.C.

| **N0.** | **Crops grown** | **Size in *Timad*** |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |

4. Please, indicate the number of farm animals you possess in the Table below:

| **N0.** | **Animal type** | **Number of each type of** |
|---|---|---|

| | | animal |
|---|---|---|
| 1 | Chicken | |
| 2 | Goats | |
| 3 | Sheep | |
| 4 | Oxen/bulls | |
| 5 | Cows/Heifer | |
| 6 | Calf | |
| 7 | Donkeys | |
| 8 | Mules | |
| 9 | Horses | |

**C. Extension induced characteristics of farmers**

1. Please, use the scale provided below to indicate how high or low you feel the public agricultural extension service has motivated you:

**Scale on motivation level**

0= Not at all
1= Very low
2 = Low
3 = Highly motivated
4 = Very highly motivated

| Code | Indicators of motivation | Ratings | | | | |
|---|---|---|---|---|---|---|
| Mot1 | Stimulated to think | 0 | 1 | 2 | 3 | 4 |
| Mot2 | Encouraged to say your view points in meetings | 0 | 1 | 2 | 3 | 4 |
| Mot3 | Encouraged to feel as equal partners to the agricultural extension staff in the extension educational programme | 0 | 1 | 2 | 3 | 4 |
| Mot4 | Encouraged to make your own decisions in relation to your farming activities | 0 | 1 | 2 | 3 | 4 |
| Mot5 | Encouraged to carryout participatory monitoring of your farm activities | 0 | 1 | 2 | 3 | 4 |
| Mot6 | Encouraged to be involved in evaluating outcomes of your farm activities | 0 | 1 | 2 | 3 | 4 |
| Mot7 | Encouraged to get assistance from other agencies in relation to your specific farm activities and needs | 0 | 1 | 2 | 3 | 4 |
| Mot8 | Increased self-initiation as a result of praises for any successful performance in your farm activities | 0 | 1 | 2 | 3 | 4 |

2. Using the scale provided, please, rate to what extent you are satisfied with the roles of the public agricultural extension service listed below:

**Scale on satisfaction level**

0= Not at all satisfied
1=Very lowly satisfied
2 = Lowly satisfied
3 = Highly satisfied
4 = Very highly satisfied

| Code | Indicators of satisfaction | Ratings | | | | |
|---|---|---|---|---|---|---|
| Sat1 | Clarity of the purpose of conducting extension programmes | 0 | 1 | 2 | 3 | 4 |
| Sat2 | Facilitating two-ways communication | 0 | 1 | 2 | 3 | 4 |
| Sat3 | Incorporating relevant indigenous practices into the extension educational programmes | 0 | 1 | 2 | 3 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sat4 | Linking the service with specific needs of farmers | 0 | 1 | 2 | 3 | 4 |
| Sat5 | Up-to-datedness of information | 0 | 1 | 2 | 3 | 4 |
| Sat6 | Degree of link of information with farmers' comprehending capacity | 0 | 1 | 2 | 3 | 4 |
| Sat7 | Providing unbiased information | 0 | 1 | 2 | 3 | 4 |
| Sat8 | Appropriateness of extension methods used | 0 | 1 | 2 | 3 | 4 |
| Sat9 | Quality of educational materials used | 0 | 1 | 2 | 3 | 4 |
| Sat10 | Sensitivity to differences in economic status of farmers | 0 | 1 | 2 | 3 | 4 |
| Sat11 | Sensitivity to differences related to gender | 0 | 1 | 2 | 3 | 4 |
| Sat12 | Sensitivity to differences related to agro-ecological diversity | 0 | 1 | 2 | 3 | 4 |
| Sat13 | Creating link with other relevant supporting institutions | 0 | 1 | 2 | 3 | 4 |
| Sat14 | Distance of Farmers' Training Centre | 0 | 1 | 2 | 3 | 4 |
| Sat15 | Convenience of extension demonstration sites and other meeting places | 0 | 1 | 2 | 3 | 4 |
| Sat16 | Facilitating peer learning (learning from other farmers) | 0 | 1 | 2 | 3 | 4 |
| Sat17 | The public agricultural extension's contribution to increase farm productivity | 0 | 1 | 2 | 3 | 4 |
| Sat18 | Knowledge gained by participating in extension educational programmes of the public agricultural extension | 0 | 1 | 2 | 3 | 4 |
| Sat19 | Skills gained by participating in extension educational programmes of the public agricultural extension | 0 | 1 | 2 | 3 | 4 |
| Sat20 | Facilitating Farmers' Research and Extension activities | 0 | 1 | 2 | 3 | 4 |
| Sat21 | Bringing desired behavioural change in farmers in relation to doing farm activities in a better way | 0 | 1 | 2 | 3 | 4 |

3. Using the scale below, indicate how high or low you feel *before* and *after* participating in the public agricultural extension educational programmes regarding the conditions listed below:

**Scale**

0= Not at all
1=Very low
2 = Low
3 = High
4 = Very high

| **Before participating** | | | | | **Code** | **Conditions** | **Now – after participating** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | Emp1 | Access to information for decision | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | Emp2 | Capacity to choose through a better decision-making power | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | Emp3 | Self-confidence | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | Emp4 | Capacity to initiate innovative practices | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | Emp5 | Developing your own solution for a problem | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | Emp6 | Acquiring tools to critically monitor farm practices | 0 | 1 | 2 | 3 | 4 |
| 0 | 1 | 2 | 3 | 4 | Emp7 | Integrating local and outside knowledge confidently | 0 | 1 | 2 | 3 | 4 |

**4. Farmers' participation in extension programme delivery**

2. Indicate whether or not you participate in the following stages of extension educational programme development and delivery in your area; and indicate also to what extent and how you participate.

| Code | Stages of extension educational programme | Do you Participate? | | If "Yes", indicate your level of participation | | | | If "Yes", how? |
|---|---|---|---|---|---|---|---|---|
| | | 1=Yes | N0=2 | 1 Very low | 2 Low | 3 High | 4 Very high | |
| p1 | Participate in need assessment and problem identification | 1 | 2 | 1 | 2 | 3 | 4 | |
| p2 | Participate in identifying alternative courses of actions for extension educational process | 1 | 2 | 1 | 2 | 3 | 4 | |
| p3 | Participate in identifying appropriate extension educational activities | 1 | 2 | 1 | 2 | 3 | 4 | |
| p4 | Participate in selecting appropriate extension educational contents | 1 | 2 | 1 | 2 | 3 | 4 | |
| p5 | Participate in selecting appropriate methods for extension educational programme delivery | 1 | 2 | 1 | 2 | 3 | 4 | |
| p6 | Participate in monitoring implemented extension programmes | 1 | 2 | 1 | 2 | 3 | 4 | |
| p7 | Participate in evaluating outcomes of extension programmes | 1 | 2 | 1 | 2 | 3 | 4 | |

D. **Development agents' professional and technical competence**

1. Please, rate the professional competence of the development agents that work with you.

**Professional competence level**

1. Very low competence
2 . Low competence
3 . High competence
4. Very high competence

| Code | Indicators of professional competence | Ratings | | | |
|---|---|---|---|---|---|
| Dp1 | Interpersonal communication | 1 | 2 | 3 | 4 |
| | Group communication | 1 | 2 | 3 | 4 |
| | Organizing and forming groups | 1 | 2 | 3 | 4 |
| | Simplifying technical information to farmers | 1 | 2 | 3 | 4 |
| | Using analogy in communication | 1 | 2 | 3 | 4 |
| | Listening to farmers | 1 | 2 | 3 | 4 |
| | Demonstrating a leadership role | 1 | 2 | 3 | 4 |
| | Handling sensitively the needs of diverse groups | 1 | 2 | 3 | 4 |
| | Problem solving | 1 | 2 | 3 | 4 |
| | Use of appropriate audio-visual aids | 1 | 2 | 3 | 4 |
| | Facilitating participatory learning and action | 1 | 2 | 3 | 4 |
| | Supervising farmers | 1 | 2 | 3 | 4 |
| | Monitoring activities with farmers | 1 | 2 | 3 | 4 |
| Dp14 | Evaluating programmes with farmers | 1 | 2 | 3 | 4 |

2. Using the scale given below, how would you rate the technical competence of the development agents that work with?

**Technical competence level**

1. Very low competence
2 . Low competence
3. High competence
4. Very high competence

| Code | Indicators of technical competence | Ratings | | | |
|---|---|---|---|---|---|
| Dt1 | Land preparation for sowing crops | 1 | 2 | 3 | 4 |
| | Knowledge on time of sowing crops | 1 | 2 | 3 | 4 |
| | Nursery site selection and preparation | 1 | 2 | 3 | 4 |
| | Demonstrating conservation ploughing | 1 | 2 | 3 | 4 |
| | Mechanical soil and water conservation techniques | 1 | 2 | 3 | 4 |
| | Biological soil and water conservation techniques | 1 | 2 | 3 | 4 |
| | Water harvesting techniques | 1 | 2 | 3 | 4 |
| | Knowledge on irrigation | 1 | 2 | 3 | 4 |
| | Compost preparation and application | 1 | 2 | 3 | 4 |
| | Timing and ways of fertilizer application | 1 | 2 | 3 | 4 |
| | Weed identification and management | 1 | 2 | 3 | 4 |
| | Insect identification and control in crops | 1 | 2 | 3 | 4 |
| | Disease identification and control in crops | 1 | 2 | 3 | 4 |
| | Knowledge on appropriate time of harvesting crops | 1 | 2 | 3 | 4 |
| | Knowledge on post harvest handling of crops | 1 | 2 | 3 | 4 |
| | Livestock breed selection for specific purpose (fattening, dairying) | 1 | 2 | 3 | 4 |
| | Mastery of livestock breeding (heat period, AI) | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| | Livestock feed management | 1 | 2 | 3 | 4 |
| | Chicken selection for specific purpose (meat, egg) | 1 | 2 | 3 | 4 |
| | Disease identification and control in livestock | 1 | 2 | 3 | 4 |
| Dt21 | Providing market information on crops and livestock | 1 | 2 | 3 | 4 |

E. Please, indicate how relevant the various extension packages being promoted by the public agricultural extension service are to you.

**Level of package relevance**

0. Not at all
1. Very low
2. Low
3. High
4. Very high

| Code | Extension packages being promoted | Relevance Ratings | | | | |
|---|---|---|---|---|---|---|
| Rp1 | Natural resource management | 0 | 1 | 2 | 3 | 4 |
| | Cereal crops production and management | 0 | 1 | 2 | 3 | 4 |
| | Horticultural crops production and management | 0 | 1 | 2 | 3 | 4 |
| | Poultry production and management | 0 | 1 | 2 | 3 | 4 |
| | Small ruminant production and management | 0 | 1 | 2 | 3 | 4 |
| | Dairy farming | 0 | 1 | 2 | 3 | 4 |
| | Fattening | 0 | 1 | 2 | 3 | 4 |
| | Livestock feed preparation and management | 0 | 1 | 2 | 3 | 4 |
| Rp9 | Farm tools | 0 | 1 | 2 | 3 | 4 |

## F. Support to the Public Agricultural Extension Service

1. Please, rate the timely availability of agro-inputs to you.

**Scale on timely availability**

1. Very low
2. Low
3. High
4. Very high

| Code | Type of agro-inputs | Ratings on timely availability | | | |
|---|---|---|---|---|---|
| Avt1 | Seed for grain | 1 | 2 | 3 | 4 |
| | Planting materials for horticultural crops | 1 | 2 | 3 | 4 |
| | Seed/seedlings for forage | 1 | 2 | 3 | 4 |
| | Fertilizer | 1 | 2 | 3 | 4 |
| | Pesticides (insecticides, herbicides) | 1 | 2 | 3 | 4 |
| | Veterinary medicines | 1 | 2 | 3 | 4 |
| | Poultry feed | 1 | 2 | 3 | 4 |
| | Livestock feed | 1 | 2 | 3 | 4 |
| Avt9 | Farm implements | 1 | 2 | 3 | 4 |

2. Please, rate the availability of agro-inputs in quantities you require

**Availability in required quantity**

1. Very low
2. Low
3. High
4. Very high

| Code | Availability of agro-inputs in quantities you require | Ratings on availability in required quantity | | | |
|---|---|---|---|---|---|
| Avq1 | Seed for grain | 1 | 2 | 3 | 4 |
| | Planting materials for horticultural crops | 1 | 2 | 3 | 4 |
| | Seed/seedlings for forage | 1 | 2 | 3 | 4 |
| | Fertilizer | 1 | 2 | 3 | 4 |
| | Pesticides (insecticides, herbicides) | 1 | 2 | 3 | 4 |
| | Veterinary medicines | 1 | 2 | 3 | 4 |
| | Poultry feed | 1 | 2 | 3 | 4 |
| | Livestock feed | 1 | 2 | 3 | 4 |
| Avq9 | Farm implements | 1 | 2 | 3 | 4 |

3. Do you get credit support from any source?
    1. Yes –– [ ]
    2. No –-- [ ]

4. If "Yes", please, rate the level of the credit support that you get in relation to your needs
    1. Very low–-–-- [ ]
    2. Low–-–-–----- [ ]
    3. High–--–---–--- [ ]
    4. Very high–------ [ ]

5. How would you rate the availability of market for your agricultural produce? Give your response only for what you produce or rear.

**Extent of market availability**

1. Very low
2. Low
3. High
4. Very high

| Code | Availability of market for | Ratings | | | |
|---|---|---|---|---|---|
| Mkt1 | Cereal crops | 1 | 2 | 3 | 4 |
| Mkt2 | Fruits | 1 | 2 | 3 | 4 |
| Mkt3 | Leafy vegetables | 1 | 2 | 3 | 4 |
| Mkt4 | Root crops | 1 | 2 | 3 | 4 |
| Mkt5 | Eggs | 1 | 2 | 3 | 4 |
| Mkt6 | Chicken | 1 | 2 | 3 | 4 |
| Mkt7 | Goats | 1 | 2 | 3 | 4 |
| Mkt8 | Sheep | 1 | 2 | 3 | 4 |
| Mkt9 | Milk | 1 | 2 | 3 | 4 |
| Mkt10 | Butter | 1 | 2 | 3 | 4 |
| Mkt11 | Fatten animal | 1 | 2 | 3 | 4 |

**G. Effectiveness of the public agricultural extension**

1. Please, indicate ***how high or low is, as you see it***, the overall effectiveness of the extension programme development and delivery process by the public agricultural extension service in relation to assisting farmers properly.
    1. Very low
    2. Low
    3. High
    4. Very high

2. What do you think should be done by the development agents and the extension organization to improve more the overall effectiveness of extension programmes for farmers?
    1. _____
    1. _____
    2. _____
    3. _____
    4. _____

Code N$^{0}$_____

## QUESTIONNAIRES TO DEVELOPMENT AGENTS

***Please, kindly respond to the questions by putting a tick mark [√] or writing where appropriately.***

### A. General background information on the development agents

2. Woreda _____

3. Sex
   1. Male ------- [ ]
   2. Female ---- [ ]

4. Age at your last birth day _____

5. Marital status
   1. Single ---------- [ ]
   2. Married ---------- [ ]
   3. Divorced ---------- [ ]
   4. Widower/Widow ---- [ ]

6. Level of education
   1. Certificate ---- [ ]
   2. Diploma ------ [ ]

7. Field of study
   1. Plant science -------- [ ]
   2. Animal science ------- [ ]
   3. General agriculture --- [ ]
   4. Natural resources ----- [ ]
   5. Other (please, specify) _____

8. For how many years have you worked as a development agent?
   _____years.

**B. Participation in extension programme development and delivery**

1. Indicate whether or not ***you participate*** in the following stages of extension educational programme development and delivery in your area; and indicate also to what extent and how you participate.

| Code | Stages of extension educational programme | Do you Participate? | | If "Yes", indicate your level of participation | | | | If "Yes", how? |
|---|---|---|---|---|---|---|---|---|
| | | 1=Yes | N0=2 | 1 Very low | 2 Low | 3 High | 4 Very high | |
| p1 | Participate in need assessment and problem identification | 1 | 2 | 1 | 2 | 3 | 4 | |
| p2 | Participate in identifying alternative courses of actions for extension educational process | 1 | 2 | 1 | 2 | 3 | 4 | |
| p3 | Participate in identifying appropriate extension educational activities | 1 | 2 | 1 | 2 | 3 | 4 | |
| p4 | Participate in selecting appropriate extension educational contents | 1 | 2 | 1 | 2 | 3 | 4 | |
| p5 | Participate in selecting appropriate methods for extension educational programme delivery | 1 | 2 | 1 | 2 | 3 | 4 | |
| p6 | Participate in monitoring implemented extension programmes | 1 | 2 | 1 | 2 | 3 | 4 | |
| p7 | Participate in evaluating outcomes of extension programmes | 1 | 2 | 1 | 2 | 3 | 4 | |

2. Indicate whether or not ***farmers participate*** in the following stages of extension educational programme development and delivery; and indicate also to what extent and how they participate.

| Code | Stages of extension educational programme | Do you Participate? | | If "Yes", indicate your level of participation | | | | If "Yes", how? |
|---|---|---|---|---|---|---|---|---|
| | | 1=Yes | N0=2 | 1 Very low | 2 Low | 3 High | 4 Very high | |
| p1 | Participate in need assessment and problem identification | 1 | 2 | 1 | 2 | 3 | 4 | |
| p2 | Participate in identifying alternative courses of actions for extension educational process | 1 | 2 | 1 | 2 | 3 | 4 | |
| p3 | Participate in identifying appropriate extension educational activities | 1 | 2 | 1 | 2 | 3 | 4 | |
| p4 | Participate in selecting appropriate extension educational contents | 1 | 2 | 1 | 2 | 3 | 4 | |
| p5 | Participate in selecting appropriate methods for extension educational programme delivery | 1 | 2 | 1 | 2 | 3 | 4 | |
| p6 | Participate in monitoring implemented extension programmes | 1 | 2 | 1 | 2 | 3 | 4 | |
| p7 | Participate in evaluating outcomes of extension programmes | 1 | 2 | 1 | 2 | 3 | 4 | |

C. **Development agents' professional and technical competence**

1. Using the scale given below, please, rate your professional competence level.
    1. Very low
    2. Low
    3. High
    4. Very high

| Code | Indicators of professional competence | Professional competence ratings | | | |
|---|---|---|---|---|---|
| DAc1 | Interpersonal communication | 1 | 2 | 3 | 4 |
| DAc2 | Group communication | 1 | 2 | 3 | 4 |
| DAc3 | Organizing and forming groups | 1 | 2 | 3 | 4 |
| DAc4 | Simplifying technical information to farmers | 1 | 2 | 3 | 4 |
| DAc5 | Using analogy in communication | 1 | 2 | 3 | 4 |
| DAc6 | Listening to farmers | 1 | 2 | 3 | 4 |
| DAc7 | Leadership | 1 | 2 | 3 | 4 |
| DAc8 | Handling sensitively the needs of diverse groups | 1 | 2 | 3 | 4 |
| DAc9 | Problem solving | 1 | 2 | 3 | 4 |
| DAc10 | Use of appropriate audio-visual aids | 1 | 2 | 3 | 4 |
| DAc11 | Facilitating participatory learning and action | 1 | 2 | 3 | 4 |
| DAc12 | Supervising farmers | 1 | 2 | 3 | 4 |
| DAc13 | Monitoring activities with farmers | 1 | 2 | 3 | 4 |
| DAc14 | Evaluating programmes with farmers | 1 | 2 | 3 | 4 |

2. Using the scale given below, please, rate your technical competence level.
    1. Very low
    2. Low
    3. High
    4. Very high

| Code | Indicators of technical competence | Technical competence Ratings | | | |
|---|---|---|---|---|---|
| DAt1 | Land preparation for sowing crops | 1 | 2 | 3 | 4 |
| DAt2 | Knowledge on time of sowing crops | 1 | 2 | 3 | 4 |
| DAt3 | Nursery site selection and preparation | 1 | 2 | 3 | 4 |
| DAt4 | Demonstrating conservation ploughing | 1 | 2 | 3 | 4 |
| DAt5 | Mechanical soil and water conservation techniques | 1 | 2 | 3 | 4 |
| DAt6 | Biological soil and water conservation techniques | 1 | 2 | 3 | 4 |
| DAt7 | Water harvesting techniques | 1 | 2 | 3 | 4 |
| DAt8 | Knowledge on irrigation | 1 | 2 | 3 | 4 |
| DAt9 | Compost preparation and application | 1 | 2 | 3 | 4 |
| DAt10 | Timing and ways of fertilizer application | 1 | 2 | 3 | 4 |
| DAt11 | Weed identification and management | 1 | 2 | 3 | 4 |
| DAt12 | Insect identification and control in crops | 1 | 2 | 3 | 4 |
| DAt13 | Disease identification and control in crops | 1 | 2 | 3 | 4 |
| DAt14 | Knowledge on appropriate time of harvesting crops | 1 | 2 | 3 | 4 |
| DAt15 | Knowledge on post harvest handling of crops | 1 | 2 | 3 | 4 |
| DAt16 | Livestock breed selection for specific purpose (fattening, dairying) | 1 | 2 | 3 | 4 |
| DAt17 | Mastery of livestock breeding (heat period, AI) | 1 | 2 | 3 | 4 |
| DAt18 | Livestock feed management | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| DAt19 | Chicken selection for specific purpose (meat, egg) | 1 | 2 | 3 | 4 |
| DAt20 | Disease identification and control in livestock | 1 | 2 | 3 | 4 |
| DAt21 | Providing market information on crops and livestock | 1 | 2 | 3 | 4 |

D. Please, indicate how high or low the various extension packages being promoted by the public agricultural extension service are relevant to farmers.

**Relevance of packages**

a. Very low relevance
b. Low relevance
c. High relevance
d. Very high relevance

| Code | Types of Extension packages being promoted | Relevance Ratings | | | |
|---|---|---|---|---|---|
| Rpk1 | Natural resource management | 1 | 2 | 3 | 4 |
| Rpk2 | Cereal crops production and management | 1 | 2 | 3 | 4 |
| Rpk3 | Horticultural crops production and management | 1 | 2 | 3 | 4 |
| Rpk4 | Poultry production and management | 1 | 2 | 3 | 4 |
| Rpk5 | Small ruminant production and management | 1 | 2 | 3 | 4 |
| Rpk6 | Dairy farming | 1 | 2 | 3 | 4 |
| Rpk7 | Fattening | 1 | 2 | 3 | 4 |
| Rpk8 | Livestock feed preparation and management | 1 | 2 | 3 | 4 |
| Rpk9 | Farm tools | 1 | 2 | 3 | 4 |

**E. Support to the Public Agricultural Extension Service**

1. Please, rate the timely availability of agro-inputs for farmers.

**Timely availability**

1. Very low
2. Low
3. High
4. Very high

| Code | Types of the agro-inputs | Ratings | | | |
|---|---|---|---|---|---|
| Avit1 | Seed for grain | 1 | 2 | 3 | 4 |
| Avit2 | Planting materials for horticultural crops | 1 | 2 | 3 | 4 |
| Avit3 | Seed/seedlings for forage | 1 | 2 | 3 | 4 |
| Avit4 | Fertilizer | 1 | 2 | 3 | 4 |
| Avit5 | Pesticides (insecticides, herbicides) | 1 | 2 | 3 | 4 |
| Avit6 | Veterinary medicines | 1 | 2 | 3 | 4 |
| Avit7 | Poultry feed | 1 | 2 | 3 | 4 |
| Avit8 | Livestock feed | 1 | 2 | 3 | 4 |
| Avit9 | Farm implements | 1 | 2 | 3 | 4 |

2. Please, rate the availability of agro-inputs in quantities that farmers require

**Availability in quantities required**

1. Very low
2. Low
3. High
4. Very high

| Code | Type of the agro-inputs | Ratings | | | |
|---|---|---|---|---|---|
| Aviq1 | Seed for grain | 1 | 2 | 3 | 4 |
| Aviq2 | Planting materials for horticultural crops | 1 | 2 | 3 | 4 |
| Aviq3 | Seed/seedlings for forage | 1 | 2 | 3 | 4 |
| Aviq4 | Fertilizer | 1 | 2 | 3 | 4 |
| Aviq5 | Pesticides (insecticides, herbicides) | 1 | 2 | 3 | 4 |
| Aviq6 | Veterinary medicines | 1 | 2 | 3 | 4 |
| Aviq7 | Poultry feed | 1 | 2 | 3 | 4 |
| Aviq8 | Livestock feed | 1 | 2 | 3 | 4 |
| Aviq9 | Farm implements | 1 | 2 | 3 | 4 |

3. Please, rate the extent of policy support for agricultural extension work according to the scale given below.

**Policy support**

1. Very low
2. Low
3. High
4. Very high

| Code | Indicators of policy support availability | Ratings on policy support | | | |
|---|---|---|---|---|---|
| Ps1 | Producing DAs through formal training | 1 | 2 | 3 | 4 |
| Ps2 | Needs-based on the job training of development agents | 1 | 2 | 3 | 4 |
| Ps3 | Allocating budget for field activities | 1 | 2 | 3 | 4 |
| Ps4 | Motivating development agents through reward systems | 1 | 2 | 3 | 4 |
| Ps5 | Establishing farmer training centres | 1 | 2 | 3 | 4 |
| Ps6 | Availing means of transport to visit farmers | 1 | 2 | 3 | 4 |
| Ps7 | Facilitating self-directed learning in DAs through provision of source materials | 1 | 2 | 3 | 4 |
| Ps8 | Facilitating self-directed learning in farmers through provision of source materials | 1 | 2 | 3 | 4 |
| Ps9 | Creating experience-sharing opportunities with other DAs and other extension personnel in the *Woreda* or outside the *Woreda* | 1 | 2 | 3 | 4 |
| Ps10 | Establishing offices for DAs | 1 | 2 | 3 | 4 |
| Ps11 | Setting up development career for the DAs | 1 | 2 | 3 | 4 |
| Ps12 | Facilitating farmers' research and extension activities | 1 | 2 | 3 | 4 |
| Ps13 | Facilitating the formation and development of cooperatives as self-help organizations | 1 | 2 | 3 | 4 |

4. Please, rate the extent of research support to the wide extension package areas.

**Research support**

1. Very low
2. Low
3. High
4. Very high

| Code | Wide extension package areas | Ratings | | | |
|---|---|---|---|---|---|
| Rs1 | Natural resource management | 1 | 2 | 3 | 4 |
| Rs2 | Cereal crops production and management | 1 | 2 | 3 | 4 |
| Rs3 | Horticultural crops production and management | 1 | 2 | 3 | 4 |
| Rs4 | Poultry production and management | 1 | 2 | 3 | 4 |

| | | | | | |
|---|---|---|---|---|---|
| Rs5 | Small ruminant production and management | 1 | 2 | 3 | 4 |
| Rs6 | Dairy farming | 1 | 2 | 3 | 4 |
| Rs7 | Fattening | 1 | 2 | 3 | 4 |
| Rs8 | Livestock feed | 1 | 2 | 3 | 4 |
| Rs9 | Farm tools | 1 | 2 | 3 | 4 |

5. Please, rate the extent the wide extension package areas are supported by subject matter specialists

**Subject Matter Specialist Support**

1. Very low
2. Low
3. High
4. Very high

| **Code** | **Wide extension package areas** | **SMS Support Ratings** | | | |
|---|---|---|---|---|---|
| SMS1 | Natural resource management | 1 | 2 | 3 | 4 |
| SMS2 | Cereal crops production and management | 1 | 2 | 3 | 4 |
| SMS3 | Horticultural crops production and management | 1 | 2 | 3 | 4 |
| SMS4 | Poultry production and management | 1 | 2 | 3 | 4 |
| SMS5 | Small ruminant production and management | 1 | 2 | 3 | 4 |
| SMS6 | Dairy farming | 1 | 2 | 3 | 4 |
| SMS7 | Fattening | 1 | 2 | 3 | 4 |
| SMS8 | Livestock feed preparation and management | 1 | 2 | 3 | 4 |
| SMS9 | Farm tools | 1 | 2 | 3 | 4 |

6. Do farmers get credit from any source for their farm activities?
   1. Yes ----- [ ]
   2. No-------[ ]

7. If your response is, “Yes”, for the preceding question, please, rate the availability of the credit support for the farmers in relation to their needs
   1. Very low-------[ ]
   2. Low----------[ ]
   3. High ----------[ ]
   4. Very high ------[ ]

7. Please, rate the availability of encouraging markets for farmers for the following agricultural commodities

**Market support level**

1. Very low
2. Low
3. High
4. Very high

| Code | Availability of encouraging markets | Ratings | | | |
|---|---|---|---|---|---|
| Mkt1 | Cereal crops | 1 | 2 | 3 | 4 |
| Mkt2 | Fruits | 1 | 2 | 3 | 4 |
| Mkt3 | Leafy vegetables | 1 | 2 | 3 | 4 |
| Mkt4 | Root crops | 1 | 2 | 3 | 4 |
| Mkt5 | Eggs | 1 | 2 | 3 | 4 |
| Mkt6 | Chicken | 1 | 2 | 3 | 4 |
| Mkt7 | Goats | 1 | 2 | 3 | 4 |
| Mkt8 | Sheep | 1 | 2 | 3 | 4 |
| Mkt9 | Milk | 1 | 2 | 3 | 4 |
| Mkt10 | Butter | 1 | 2 | 3 | 4 |
| Mkt11 | Fatten animal | 1 | 2 | 3 | 4 |

**F. Effectiveness of the public agricultural extension**

1. Please, indicate ***how high or low is, as you see it***, the overall effectiveness of the extension programme development and delivery process by the public agricultural extension service.
    1. Very low-------[ ]
    2. Low----------[ ]
    3. High ----------[ ]
    4. Very high ------[ ]

2. What do you think should be done by the development agents and the extension organization to improve more the overall effectiveness of extension programmes for farmers?
    1. _____
    2. _____
    3. _____
    4. _____
    5. _____